UNISYS

U 5000/20, U 5000/30, U 5000/35, U 5000/40, U 5000/50, and U 5000/55 Systems

U 5000 Series Operating System

Operations Guide

Priced Item

April 1988

Printed in U S America
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UNISYS

U 5000/20, U 5000/30, U 5000/35, U 5000/40, U 5000/50, and U 5000/55 Systems

U 5000 Series Operating System

Operations Guide

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Chapter 1. Introduction

This guide describes console operations and step-by-step instructions for normal operator functions as they apply to the Unisys 5000/20, 5000/30, 5000/35, 5000/40, 5000/50, and 5000/55 processors. Except for Chapters 5 and 6 which contain information on how to use the internal and external mass storage drives, this book is intended for operators of the 5000 Series Operating System who have experience using a UNIX-based operating system. For most of the procedures described in this guide, you should have at least two years of data processing experience or training. You should also be familiar with the processor hardware in your system.

Procedures and examples are given for starting up your system (powering up and booting), changing run levels from single-user to mutliuser and vice versa, saving and restoring files, bringing down the system in an orderly manner, and restoring the system after a system stop. In addition, the last two chapters contain specific information for operating the internal diskette and tape drives and external hard disk and tape drives of the processor.

Most of the operations you do involve the system console. All output to the operator and input from the operator are by means of the system console. You use the system console in one of three modes:

- Halt — in which the 5000 Series Operating System is halted. Only console commands from the system console are accepted.

- Single-user — in which the 5000 Series Operating System is executing. The commands you enter on the system console are 5000 system commands. In single-user mode you are always superuser. When the system is halted or in single-user mode, the console is the only interface to the system, unless you specifically change the configuration so that another terminal acts as a console.

- Multiuser — in which the 5000 Series Operating System is executing. The system console (and any other configured terminal) is treated as a normal user terminal.

In halt mode, the console is not treated as a login terminal therefore, you are superuser. When you change the system to single-user or multiuser mode, a login message appears on the console. You must provide a login and password at this point in order to use the console. Normally you should log in as **root**. Here, it must be mentioned that the login you (the operator) use is a local decision. In fact, your system administrator may configure your system so that it is not even necessary for you to log in after changing to single-user or multiuser. Chapters 3 and 4 describe normal daily maintenance requirements and provide examples of normal operations (not including local procedures). For more information on the console, consult your console terminal owner's manual.

Documentation Conventions

Throughout this document, each reference of the form *name* (1M), *name* (7), or *name* (8) refers to entries in the Administration Reference Manual. All other references of

the form *name* (**N**), where **N** is a number possibly followed by a letter, refer to entries in section **N** of the User Reference Manual or Programming Reference Manual.

Throughout this document, the following notations are used for computer input/output:

1. Special characters are enclosed in **< >** (for example, when you see < **Ctrl** > read this as the "control" or "function" key and < **cr** > as the "carriage return" key).

2. Items within [ ] (brackets) are optional.

3. You should type in literally any command field that appears **boldface** (a keyword).

4. You should substitute with the appropriate information any command field that appears in *italics*.

5. All commands (operating system or console commands) should be terminated with a carriage return.

Because this guide is intended to be as general as possible, little installation-specific information is included. Also, some operations may vary according to local procedures. It is suggested that you contact your system administrator for specific information about:

- hardware configuration,
- software configuration of administrative files,
- data set or modem configuration,
- specific logging and record-keeping practices,

- contacts for hardware and software problems, and
- site-dependent diagnostic procedures.

In addition, remember to refer to the *U 5000 and U 7000 Series Operating Systems Menu System Operating Guide*. Many of the procedures described in the guide you are now reading can be accomplished by using the Menu System, rather than by using traditional approaches. In fact, if you are unlikely to use a traditional technique, we refer you directly to the Menu System Guide. In most cases, however, the conventional approach is still available.

Chapter 2. Start-up Procedures

Introduction

This chapter describes how to start up your 5000 system. Starting the system may simply mean booting if the system has been shut down routinely or if a system stop has occurred. Or, it may be necessary to power up the processor and peripherals such as printers if they have been powered down. See the chapter called "Operator Duties" for shutdown procedures. The final step when starting up the system is the boot. The boot procedure loads a copy of the 5000 Series Operating System from disk (or streaming tape) into memory and executes it. You need to reboot the operating system after one of the following conditions occurs: system stop or restart; installation of a new software release; updating of a software release; or after the **fsck** command requests a reboot (without sync).

The boot typically puts your system into the single-user run level awaiting your commands. The operating system uses the **init** command to automatically enter the final run level when properly configured by your system administrator. Run levels are discussed in the chapter of this guide called "Single-User and Multiuser." Normally run level 0 indicates single-user and 1 indicates multiuser. For more information on **init** refer to **init**(1M) in the Administration Reference Manual, *inittab* (4) in the Programming Reference Manual, or consult your local system administrator. To obtain a system dump, (before rebooting after a system stop) follow the procedure in *crash*(8) in the Administration Reference Manual.

Chapter 2

Controls and Indicators

Your operator interface to the hardware system is a control panel with a single ON/OFF switch and several status indicators. The ON/OFF switch is typically used for daily start up procedures and to remove operating voltages from the system when it is not in use. The status indicators provide hardware integrity information and hardware activity information. Keep in mind that the primary interaction with the system is through a CRT terminal. Refer to Figures 2-1, 2-2, 2-3, and 2-4 for particulars of your specific system.

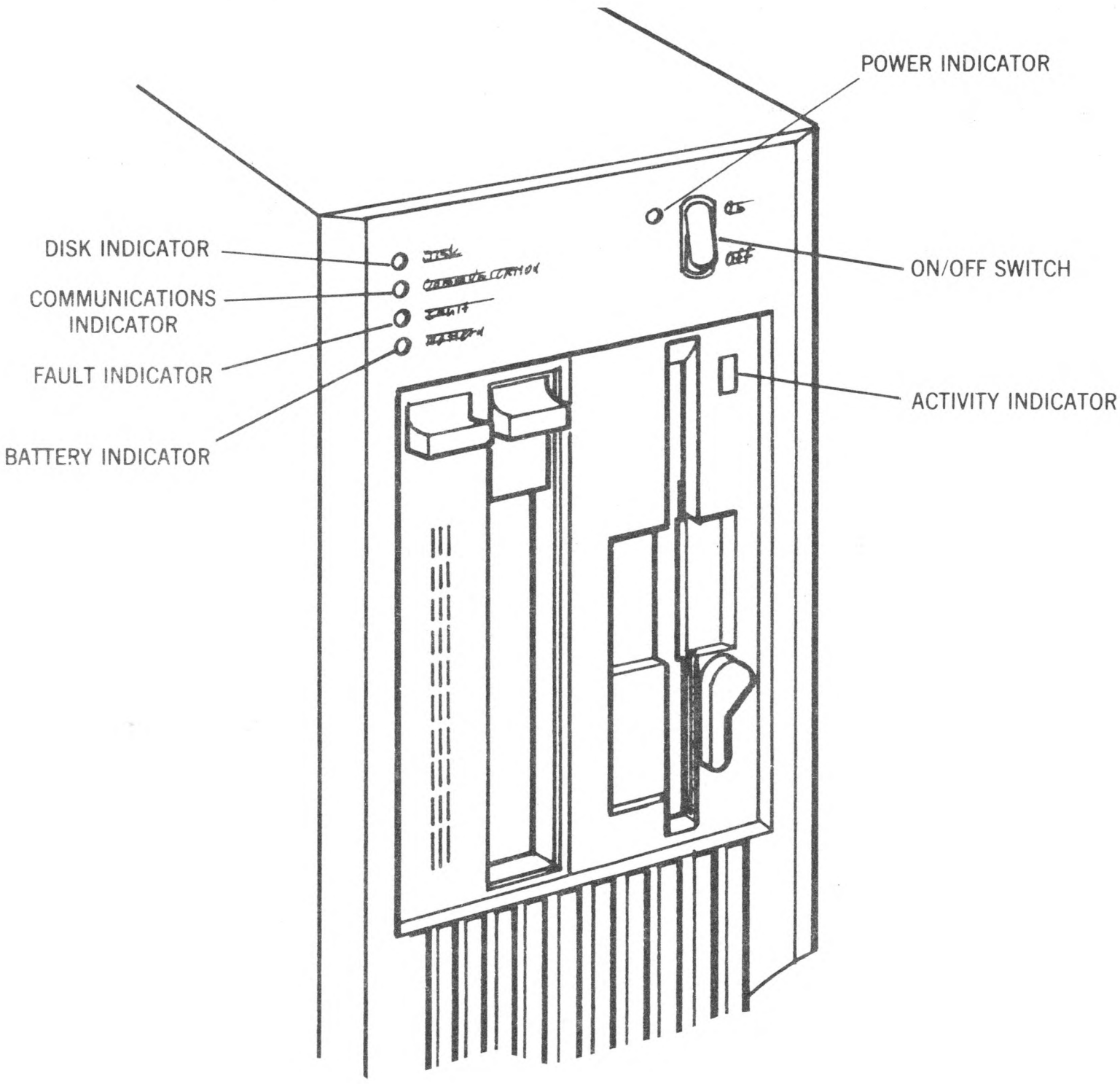

Figure 2-1. 5000/20 Controls and Indicators

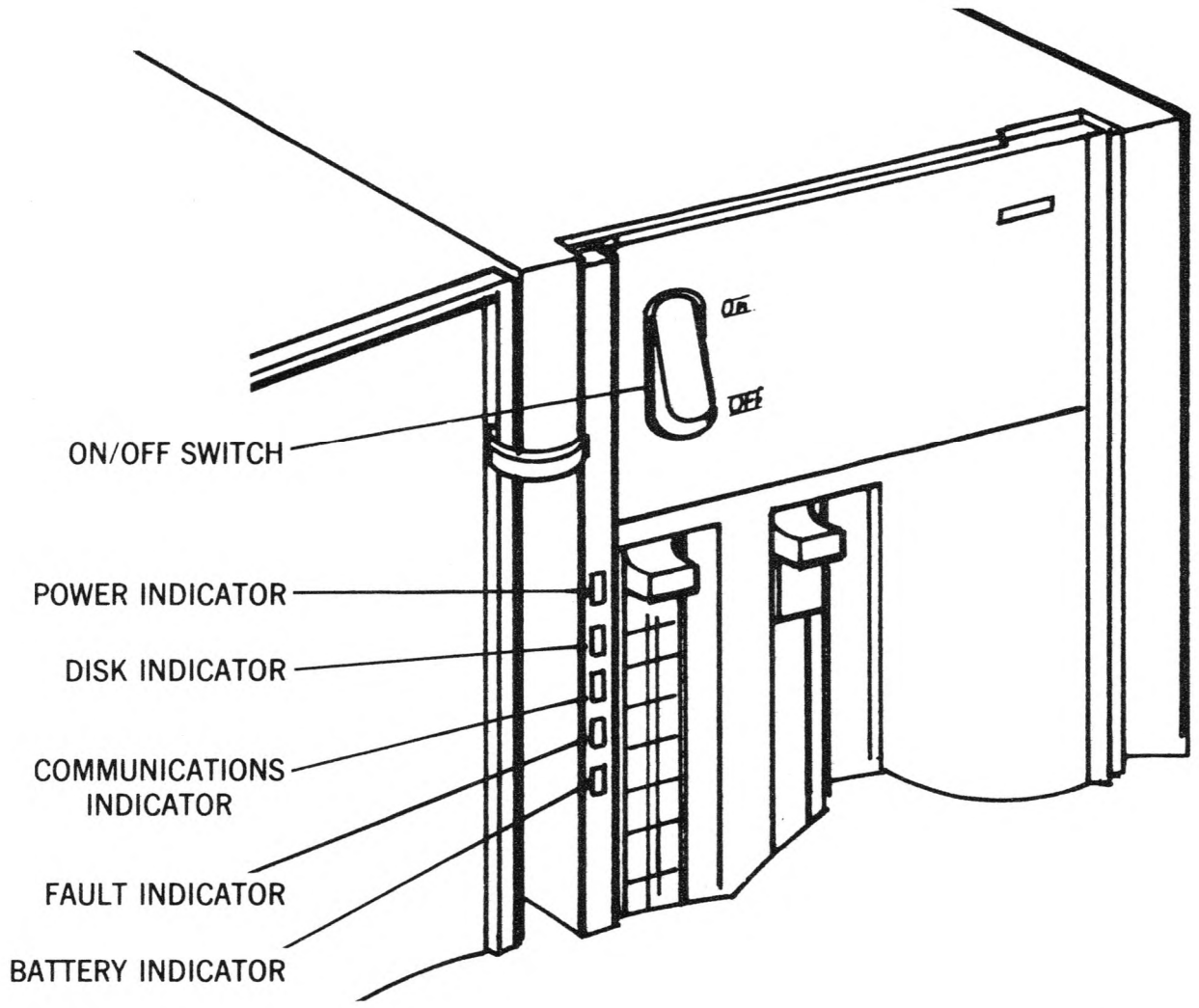

Figure 2-2. 5000/30 or 5000/35 Controls and Indicators

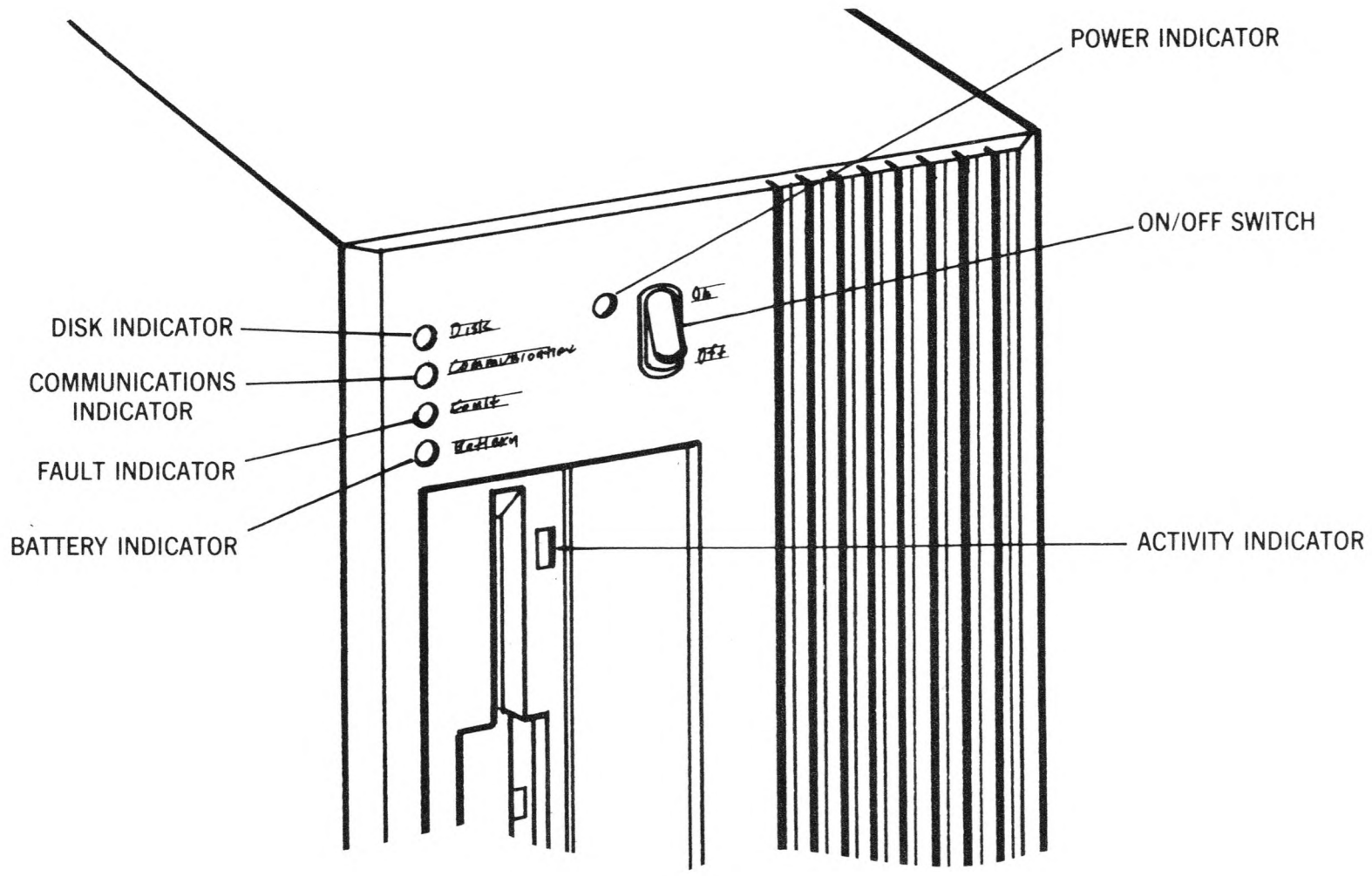

Figure 2-3. 5000/40 Controls and Indicators

Chapter 2

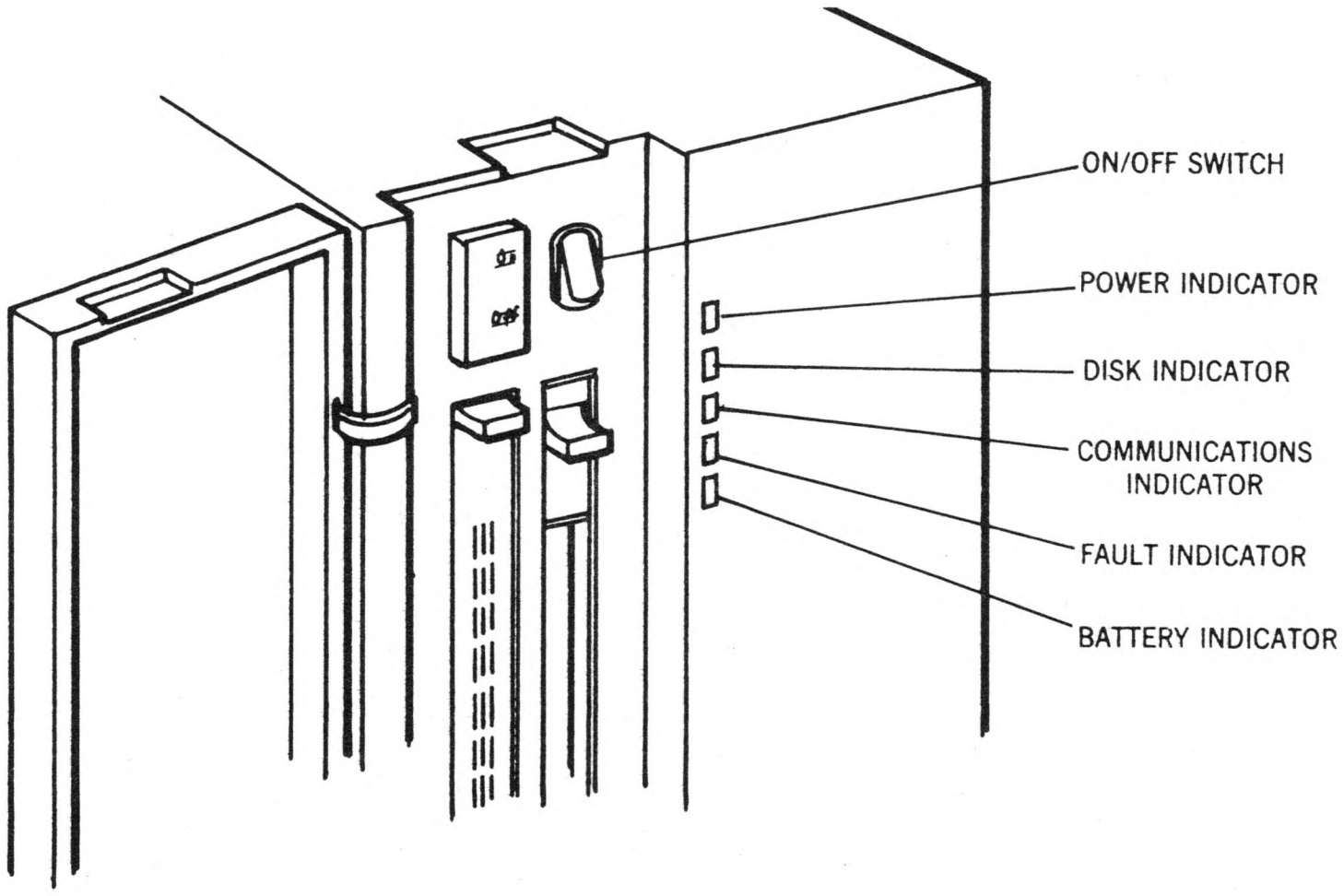

Figure 2-4. 5000/50 or 5000/55 Controls and Indicators

Control Panel Elements

The following information identifies the function of the control panel elements:

Power Switch

- ON — enables the operation of the system by putting the power system in an ON state. In addition, moving the switch from OFF to ON causes the system logic elements to perform a predefined start up sequence consisting of basic integrity testing, loading system software into memory if it is installed and has not previously been loaded, and enabling system software.

- OFF — Disables the operation of the system by putting the power system in an OFF state. With the switch in the OFF position, the memory support system, if enabled, preserves the contents of system memory and keeps the system time-of-day clock current.

NOTE:

If the battery is dead or defective, the system will not power up regardless of the battery back-up switch. If this situation occurs, contact your Unisys representative.

Power Indicator

- Green — identifies that the power system logic operating voltages, including the memory support system voltages, are enabled and operating within their specified range. This is the normal operating mode.

- Red — identifies that a power system logic operating voltage, including the memory support system voltage, is not within its specified operating range. The system is not operational if this condition exists.

- Off — identifies the OFF condition for the power system excluding the memory support system.

Disk Indicator

- On — signifies that an internal disk is selected and performing an operation. Depending on the duration of the disk activity, the indication may appear only as a flicker.

- Off — identifies the absence of internal disk activity.

Communication Indicator

- On — means one or more remote communication channels is requesting a line connection.

- Off — indicates a remote communication channel removed its request for a line connection.

Fault Indicator

- On — indicates a critical system failure. The system is not operational when lit. Usually, the system can be returned to operational status by moving the power switch from ON to OFF, and then back to ON.

- Blink — means that the file system is 97% full.

- Off — indicates that the system is operational.

Battery Indicator

- On — shows that a fault exists in the memory support system. When this condition occurs, the system also turns on the Fault Indicator to identify a critical system failure. The system is not operational.

- Flashing — means the battery is being charged. The battery may or may not preserve the contents of memory if AC power is lost.

- Off — indicates that the battery is fully charged and capable of preserving the contents of memory during an AC power failure.

Diskette Indicator

If your system has a diskette drive, it has a diskette indicator.

- On — signifies the diskette drive is selected or a diskette operation is in progress.

- Off — identifies the absence of diskette activity.

Streaming Tape Indicator

Your system has one streaming tape drive with an indicator. The 5000/55 system, however, could accomodate a second streaming tape drive. (Refer to the section in Chapter 5 called "5000/35 and 5000/55 150-Megabyte Streaming Tape Drive.")

- On — means the streaming tape drive is selected or an operation is in progress.

- Off — identifies the absence of streaming tape activity.

Additional Controls

Below the top panel of the 5000/20, 5000/30, 5000/35, 5000/40, 5000/50, or 5000/55 system are additional switches and a set of status indicators. To access them, remove the top panel by lifting it up. The following information identifies the functions of the control elements located below the top panel.

RESET/RUN Switch

- When toggled to the RESET position, causes the system to reboot. This switch allows the operator to reboot the system without powering it down. A reboot is necessary after a system stop, or when **fsck** has made significant corrections to a damaged file system.

MANUAL/AUTO LOAD Switch

- Manual — is used when the system reboots, manual intervention is needed to specify the load device.

- Auto Load — requires no manual intervention when the system reboots. The disk is the default load device.

Run Indicators

- On — shows that the system is running.

- Off — indicates that the system is not running.

Status Indicators

- Off — shows that the system is in a normal condition.

- On — indicates that the system is in an abnormal condition.

Powering Up the System

Perform the following steps to power up the system:

1. Prepare the system peripherals for operation by turning them on, enabling the proper modes, installing and setting forms, etc.

2. Power on the system console, press the setup key, place it on line, and (if necessary) configure it as follows:

character wrap at end of line - yes
screen roll - yes
auto line feed (newline) - no
(RETURN sends CR)
local echo - no
type - ANSI, VT100
speed-9600
handshake - XON/XOFF
data bits - 7
parity - EVEN

NOTE:

Not all terminals allow configuration of some of the previously mentioned attributes.

3. Move the POWER switch on the control panel to the ON position.

4. The event sequence which occurs next depends on the setting of the MANUAL/AUTO LOAD switch (under the top panel). If the MANUAL/AUTO LOAD switch is in the AUTO LOAD position, the system automatically begins a series of power-on-confidence tests. This testing sequence generates a message of the form:

```
AUTO TEST SEQUENCE

TEST:  IVT TOD EDC MMU MEM HI0 DK5
TEST:  STP
```

The test message line (or lines) identifies hardware components that are being tested. *Because hardware configuration can vary from system to system, the message line(s) can also vary.*

After the series of self tests is complete, the system begins booting. As the system boots, progress messages are sent to the system console. When the boot is complete, a login message appears on the system console.

5. If the MANUAL/AUTO LOAD switch is in the MANUAL position, a **SELECT STARTUP FUNCTION** menu is displayed. To perform the power-on confidence tests, select item **5 (TEST)** from the menu. After completing the desired tests, select item **3 (LOAD)** from the menu, and the system begins booting. The next section describes the boot process.

Booting the System

After the system is powered up, or after the RESET/RUN switch (under the top panel) is toggled to the RESET position, the system begins booting. If the MANUAL/AUTO LOAD switch (under the top panel) is set to AUTO LOAD, the system attempts to boot from one or more drives. If an external hard disk drive isn't connected to the system, the system attempts to boot from the internal disk. If the external drive is present, the system attempts to boot from it. If the external disk does not contain the root file system, however, the system (after about 2 minutes) attempts to boot from the internal disk. If the switch is set to MANUAL, the operator must specify the name of the load device and the pathname of the operating system (usually /unix). In normal operation, leave the MANUAL/AUTO LOAD switch in the AUTO LOAD position.

Automatic Boot

1. Move the MANUAL/AUTO LOAD switch to the AUTO LOAD position.

2. Move the POWER switch to the ON position or (if already powered up) toggle the RESET/RUN switch to the RESET position.

3. The system automatically begins a series of power on confidence tests. This test sequence generates a message of the form:

   AUTO TEST SEQUENCE
   TEST: IVT TOD EDC MMU MEM HI0 DK5
   TEST: STP

   The test message line (or lines) identifies the hardware components that are being tested. *Because hardware configurations can vary from system to system, the message line(s) can also vary.* (See the hardware device list in the section in this chapter called "Manual Boot" step number 6). If a certain component is not ready or is not configured, the testing sequence generates a message of the form:

   name UNIT NOT READY/PRESENT

4. The system begins loading, generating a message of the form:

   LOADING "/unix" FROM DEVICE *name*

5. On the 16-bit 5000/20 or 5000/40, the system issues the following message as it initializes.

   AVAILABLE MEM SIZE *hex-number*
   SYSTEM OKAY
   STARTUP FUNCTIONS COMPLETE

   System Release: *string*
   System Version: *string*
   System Nodename: *name*
   System Processor: *microprocessor*

Four K Pagemap Enabled
[Configuration Dependent]
maxmem *decimal-number*
user memory *decimal-number*
max program size *decimal-number*

On the 32-bit 5000/30, 5000/35, 5000/40, 5000/50, or 5000/55 the system issues the following messages as it initializes:

AVAILABLE MEM SIZE *hex-number*
SYSTEM OKAY
STARTUP FUNCTIONS COMPLETE

System Release: *string*
System Version: *string*
System Nodename: *name*
System Processor: *microprocessor*

Caches Enabled: Processor ATC
Program Data

maxmem *decimal-number*
user memory *decimal-number*
max program size *decimal-number*

NOTE:

If you are using a 5000/30 without cache, the Caches Enabled message does not appear.

6. When the system is initialized, the boot is complete and a login prompt appears on the system console. The system is in single-user mode.

7. To put the system in multiuser mode, login as **startup**:

   A file system check is performed. If the check passes, the system goes multiuser. If the check fails, call your system administrator.

Manual Boot

1. Move the MANUAL/AUTO LOAD switch to the MANUAL LOAD position.

2. Move the POWER switch to the ON position or (if already powered up) toggle the RESET/RUN switch to the RESET position.

3. A SELECT STARTUP FUNCTION menu is displayed.

4. Select item **3 LOAD** from the menu.

5. The system console displays ENTER DEVICE NAME.

6. Press the return key to load from the default load device. The system attempts to boot from one or more drives. If an external disk isn't connected to the system, the system attempts to boot from the internal disk. If the external disk is present, the system attempts to boot from it. If the external disk does not contain the root file system, however, the system (after about 2 minutes) attempts to boot from the internal disk. To load from another load device, enter the device name and press the return key.

5000/20, 5000/30, 5000/40, or 5000/50 systems:
Device Name h501: Internal Controller 0, Drive 1

And if the devices are present, you can enter the following drive names:

Device Name h502: Internal Controller 0, Disk 2
Device Name sd01: SCSI Controller 0, Disk 1
Device Name sd02: SCSI Controller 0, Disk 2
Device Name sd11: SCSI Controller 1, Disk 1
Device Name sd12: SCSI Controller 1, Disk 2

5000/35 or 5000/55 system:

Device Name sda1: Internal Controller 0, Disk 1
Device Name sdb1: Internal Controller 0, Disk 2
Device Name sd01: External SCSI Controller 0, Disk 1
Device Name sd02: External SCSI Controller 0, Disk 2
Device Name sd03: External SCSI Controller 0, Disk 3
Device Name sd11: External SCSI Controller 1, Disk 1
Device Name sd12: External SCSI Controller 1, Disk 2
Device Name sd13: External SCSI Controller 1, Disk 3
Device Name sd21: External SCSI Controller 2, Disk 1
Device Name sd22: External SCSI Controller 2, Disk 2
Device Name sd23: External SCSI Controller 2, Disk 3
Device Name sd31: External SCSI Controller 3, Disk 1

Device Name sd32: External SCSI Controller 3, Disk 2
Device Name sd33: External SCSI Controller 3, Disk 3

7. The system console displays ENTER PATHNAME

8. To load the default operating system, press the return key. The system automatically uses the default pathname "/unix". To load another operating system, specify its pathname (e.g., "/unix.old").

9. The system begins loading, generating a message of the form:

   LOADING "unix" FROM DEVICE *name*

   When the load is complete, the system issues:

   LOAD COMPLETE

10. The system console displays:

    PRESS SPACE BAR TO EXECUTE -
    ANY OTHER KEY TO RETURN TO STARTUP MENU

11. Press the space bar to initialize the system.

12. On the 16-bit 5000/20 or 5000/40, the system issues the following messages as the system initializes:

    AVAILABLE MEM SIZE *hex-number*
    SYSTEM OKAY
    STARTUP FUNCTIONS COMPLETE

System Release: *string*
System Version: *string*
System Nodename: *name*
System Processor: *microprocessor*
Four K Pagemap Enabled
[Configuration Dependent]

maxmem *decimal number*
user memory *decimal number*
max program size *decimal number*

On the 32-bit 5000/30, 5000/35, 5000/40, 5000/50, or 5000/55, the system issues the following messages as the system initializes:
AVAILABLE MEM SIZE *hex-number*
SYSTEM OKAY
STARTUP FUNCTIONS COMPLETE

System Release: *string*
System Version: *string*
System Nodename: *name*
System Processor: *microprocessor*
Caches Enabled: Processor ATC
Program Data

maxmem *decimal number*
user memory *decimal number*
max program size *decimal number*

NOTE:

If you are using a 5000/30 without cache, the Caches Enabled message does not appear.

13. When the system is initialized, the boot is complete and a login prompt appears on the system console. The system is in single-user mode.

14. To put the system in multiuser mode, login as **startup**:

    A file system check is performed. If the check passes, the system goes into multiuser mode. If the check fails, call your system administrator.

Chapter 3. Single-user and Multiuser

Introduction

There are two main modes of operation in the 5000 Series Operating System: single-user and multiuser. The mode of operation is specified by the run level, which has 8 possible values: 0-6, and s (or S). Single-user is defined as state 0. Although multiuser is normally level 1, your system administrator can configure the **/etc/inittab** file to run multiuser at any level from 0 to 6. Furthermore, the **inittab** file can be configured so that certain procedures are followed automatically only the first time a certain run level is entered. For example, you may be asked to verify the date and file systems the first time you change your system to multiuser. This is caused by an entry in the **inittab** file. Subsequent changes in run level will not perform this procedure automatically unless you specifically changed the **inittab** file. For more information on **init** refer to ***init***(1M) in the Administration Reference Manual, **inittab**(4) in the Programming Reference Manual, or consult your local system administrator.

When in single-user mode, all dial-up ports and hard-wired terminals are disabled and only the console terminal may interact with the processor. This mode of operation allows you to make necessary changes to the system without any other processing taking place. You will normally run the 5000 Series Operating System, however, in multiuser mode. Refer to the *U 5000 and U 7000 Series Operating Systems Menu System Guide* for menu instructions.

Chapter 3

Single-user Environment

In single-user mode, you may type any available system command (followed by a < **cr** >). When the system completes execution of the command, it prompts with the # on the next line. You use the single-user environment primarily to do filesaves, system maintenance, modification, or repair operations. If you are not using the Unisys Menu System or logging in as **startup**, then the typical sequence of commands to change the system to multiuser mode is:

fsck
init 1

The fsck Command

The command **fsck interactively** repairs any damaged file systems that result from a system stop of the operating system. You should also use it to ensure that the file systems are not damaged before going into multiuser mode or taking filesaves. Usually, you want to respond **yes** to all the prompts. In the event of a system stop, however, the damage may be extensive enough to warrant recovery from backup media. The procedure for recovery is discussed in the "File Restores" section of the chapter called "Operator Duties". See ***fsck*** in the Administration Reference Manual for details on the various options available, and the *U 5000/20, U 5000/30, U 5000/35, U 5000/40, U 5000/50, and U 5000/55 Systems; U 5000 Series Operating System; Administration Guide* for a description of all the different errors that can occur.

An example of a check of a consistent file system is illustrated in the following:

```
# fsck /dev/dsk/c0d0s1
/dev/dsk/c0d0s1
File System:  usr Volume:  p0603
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Free List
2441 files 16547 blocks 31889 free
#
```

A file system that is damaged can be repaired as shown in the following example. When checking a file system, you can avoid the questions generated by **fsck** concerning inconsistencies found by using the **y** option. This option automatically attempts repairs as though you answered yes to the questions. Use this with caution because the corrections usually involve some data loss. If you decide to interactively repair the file system, use the following example:

An example of repairing the **root** file system follows:

```
# fsck /dev/dsk/c0d0s1
/dev/dsk/c0d0s1
File System: root Volume: p0001
** Phase 1 - Check Blocks and Sizes
POSSIBLE FILE SIZE ERROR I=416
POSSIBLE FILE SIZE ERROR I=610
POSSIBLE FILE SIZE ERROR I=614
POSSIBLE FILE SIZE ERROR I=618
POSSIBLE FILE SIZE ERROR I=625
** Phase 2 - Check Pathnames
```

```
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
UNREF FILE I=416 OWNER=uucp MODE=100400
SIZE=0 MTIME=Nov 20 16:23 1987
CLEAR? y
UNREF FILE I=610 OWNER=csw MODE=100400
SIZE=0 MTIME=Nov 20 16:26 1987
CLEAR? y
UNREF FILE I=625 OWNER=cath MODE=100400
SIZE=0 MTIME=Nov 20 16:26 1987
CLEAR? y
FREE INODE COUNT WRONG IN SUPERBLK
FIX? y
** Phase 5 - Check Free List
1 DUP BLKS IN FREE LIST
BAD FREE LIST
SALVAGE? y
** Phase 6 - Salvage Free List
585 files 5463 blocks 4223 free
*****BOOT THE OS  DO NOT PERFORM A SYNC
      OPERATION *****
#
```

At this time you must immediately halt the processor and then reboot the system (see the chapter called "Start-up Procedures").

An example of repairing the root file system follows:

NOTE:

For mountable file systems, use the raw device name to speed up **fsck**.

All mountable file systems should be listed in the file **/etc/checklist** which **fsck** uses, and you should check these file systems each time the system is rebooted.

CAUTION:

Never execute **fsck** on a mounted file system as it could damage the file system. The only exception to this is the **root** file system which is always mounted.

#umount /dev/dsk/c0d1s1
#fsck /dev/dsk/c0d1s1

The 5000 Operating System responds:

```
/dev/dsk/c0d1s1
File System:1s1 Volume: p0603
**Phase 1 - Check Blocks and Sizes
POSSIBLE FILE SIZE ERROR I=2500
**Phase 2 - Check Pathnames
**Phase 3 - Check Connectivity
**Phase 4 - Check Reference Counts
UNREF FILE I=2500 OWNER=255 MODE=100755
SIZE=0 MTIME=Dec 31 1987
CLEAR? y
**Phase 5 - Check Free List
2441 files 16547 blocks 889 free
*****FILE SYSTEM WAS MODIFIED*****
```

The init 1 Command

After you have checked the file systems, you may change the operating system to multiuser. Do this by entering the command **init 1**. This command activates processes that allow users to log in to the system, turn on the accounting and error logging, mount any indicated file systems, and start the **cron** and any indicated daemons. Depending upon the type of data set or modem your site has, you may have to manually flip the toggles or push the buttons on the data sets to allow users to log in.

Multiuser Environment

If you are not using the Unisys Menu System or logging in as **startup**, then switch the system to multiuser mode by typing **init 1**. Users are permitted to access all mounted file systems and execute all available commands. In this mode, you can perform file restore procedures and take periodic status checks of the system. Some of these periodic status checks can include:

- A check of free blocks **(df)** remaining on all mounted file systems to ensure that a file system does not run out of space.
- A check on **mail** to **root** or whatever login receives requests for file restores.
- A check on the number of users on the system by entering **who**.
- A check of all running processes **ps -eaf** or **whodo** to determine if there is some process using an abnormally large amount of CPU time.

If your site has other run levels defined, you can use the **init** command to change to those run levels. Finally, to change a multiuser system to single-user, refer to the "System Shutdown" section in Chapter 4.

Chapter 4. Operator Duties

Introduction

This chapter is meant to serve as a guide for your normal duties as a computer operator. These descriptions do not represent what your job duties are, they merely outline the general procedures necessary to ensure that the system operates properly.

Filesaves

Unless timely copies of the file systems are saved, a major system stop could devastate your user community. The user files or files associated with newly installed software products could be destroyed or become inaccessible. Backups are also important in recovering from less severe system problems and operator errors.

Strategies

Backups should be scheduled on a daily, weekly, and monthly basis. Every working day (except on days when weekly or monthly backups are done), all files created or modified since the last backup should be saved. This is called a partial backup. If the system stops and files are lost, not more than a day's work is lost. If the last backup was a week ago, then even after restoring the files, any changes made since that backup are lost. Retain these copies at least until the next weekly backup. Candidates for daily backup include:

The **/usr and /etc** directories, particularly **/usr/acct** and **/usr/bin**.

Every week (except on days when monthly backups are done), perform a total backup; backup each file system completely. Retain these copies at least until the next monthly backup.

Once a month, backup each file system completely. Retain these copies permanently, possibly in a secure archive away from your building.

The system administrator should schedule backups at times when few (if any) users are on the system. This ensures that the most recent version of each file is copied correctly. In fact, to minimize potential problems, take the system to single-user mode before beginning the backup. Backups should be scheduled at the same time every day, and on the same day of every week, to avoid confusion.

A regular schedule of backups requires a large number of diskettes and/or tapes, along with adequate storage. Backup diskettes and tapes should be properly labeled with the date of the backup and the names of the files and directories contained in the backup.

After a backup is superseded, the diskette or tape may be overwritten with a new backup.

Using an Automated Procedure

The backup procedure is normally automated by the system administrator. Your administrator may have created a shell script to perform the daily, weekly, and

monthly backups as part of the local operation of your site. Such a program automatically locates modified files, copies them to disk, and optionally produces a list of the files.

On 5000 Series Operating Systems, a menu system is available to automatically perform backups. This procedure is described in the *U 5000 and U 7000 Series Operating Systems Menu System Operating Guide*.

Performing Total Backups

1. Enter single-user mode to ensure that the backup contains the latest updates.

2. Build a backup list for the file system to be saved (all files are to be backed up regardless of the date they were last modified):

   find *file.system* -print > /tmp/total

   where ***file.system*** is the full pathname of the file system.

3. Copy the file system to tape.

   - To backup to internal streaming tape, enter:

     cpio -ocvB < /tmp/total | dd of=/dev/rtp ibs=5k obs=300k

     Note that the output of ***cpio*** (blocked at 5120 bytes to the record by the **B** option) is reblocked by **dd** to 307200-byte blocks in order to make more efficient use of the streaming tape.

- To backup to a SCSI 9-track tape, enter:

  cpio -ocvB < /tmp/total | dd of=
  /dev/rmt/c0d0h ibs=5k obs=63k

  Note that the output of ***cpio*** (blocked at 5120 bytes to the record by the **B** option) is reblocked by **dd** to 64512-byte blocks in order to make more efficient use of the SCSI 9-track tape.

4. Document the contents of the tape by printing the list of files in the backup-up file system by entering:

   pr -2 -w79 -h "Tape Backup of *file.system* on *date*" /tmp/total | lp

   where ***file.system*** is the full pathname of the file system to be backed up (e.g.,/), and ***date*** is the date of the backup.

5. Remove and label the tape(s), including the date and time the backup was done. Retain the tapes at least until the next total backup. Refer to the "Strategies" section of this chapter for more information.

Performing Partial Backups

1. Enter single-user mode to ensure that the backup contains the latest updates.

2. Build a backup list for all files modified or created since the last partial backup:

   find *file.system* -mtime *days* -print >
   /tmp/partial

where ***file.system*** is the full pathname of the file system to be backed up, and ***days*** is the number of days since the last backup (partial or total).

3. Copy to tape the files modified within the specified period.

   - To backup to streaming tape:

     cpio -ocvB < /tmp/partial | dd of=/dev/rtp ibs=5k obs=300k

     Note that the output of **cpio** (blocked at 5120 bytes to the record by the **B** option) is reblocked by **dd** to 307200-byte blocks in order to make more efficient use of the streaming tape.

   - To backup to SCSI 9-track tape:

     cpio -ocvB < /tmp/partial | dd of= /dev/rmt/c0d0h ibs=5k obs=63k

     Note that the output of **cpio** (blocked at 5120 bytes to the record by the **B** option) is reblocked by **dd** to 64512-byte blocks in order to make more efficient use of the SCSI 9-track tape.

4. Document the contents of the tape by printing the list of files in the backup file system:

   pr -2 -w79 -h "Tape Backup of *file-system* on *date*" /tmp/partial | lp

   where ***file.system*** is the full pathname of the file system to be backed up (e.g., /), and ***date*** is the date of the backup.

5. Remove and label the tape(s), including the date and time the backup was done. Retain the tapes at least until the next total backup. Refer to the "Strategies" section of this chapter for more information.

File Restores

In the event of a system problem, operator error, or user error in which files are either lost or corrupted, files can be restored from the backup media. The system administrator must determine to what degree the file system is corrupted before proceeding with a restore procedure.

There are two basic restore procedures: a file restoration and a system restoration. File restoration can be on the file, directory, or root directory level. System restoration reinstalls the complete file system. The status of the system dictates which restore procedure to use.

If the system is not operational, the system administrator is unable to log on the system and perform the restore procedure. Signs of non-operational status are lack of system response at the terminal, and no disk activity shown by the disk activity indicator when known disk functions are expected, or both. In this situation, the system administrator must reset the system manually, reinstall the system, and perform a total system restoration using the most recent total system backup media.

After this procedure, file restoration must be done if any file backups were performed since the generation of the total system backup media. Each restoration is done according to the chronological order of the backup media sets. This brings the system as close as possible to the status it had at the time of the system failure.

Performing Restores

1. If the system is not operational, reinstall it as described in the *U 5000/20, U 5000/30, U 5000/35, U 5000/40, U 5000/50, and U 5000/55 Systems; U 5000 Series Operating System; Installation and Implementation Guide.*

2. Files and directories may be restored unconditionally or conditionally. When a file is being restored unconditionally, and it currently exists on the system, it is overwritten with the file from the restore media. If a file exists on the system, and the file is not on the restore media, no action is taken

   Unconditional restores should be used for single file restoration, and can be used when restoring on the directory level. However, the administrator should be aware that files in the directory being restored assume the status they had at the time the restore media was created. In other words, be careful not to overwrite an existing file with an older version from the restore media.

   When a file is being restored conditionally, and it does not exist on the system, it is copied from the restore media to the system. If the file on the system has a modification date that is older than its counterpart on the restore media, the file from the restore media is copied to the system. If a file exists on the system that is not on the restore media, no action is taken.

3. For multiple-file restoration, start with the most recent total backup, and proceed through any partial backups taken since then. Partial backups must be

examined chronologically, starting with the oldest, to ensure proper restoration.

Single-file restoration may be done using the media from the most recent backup involving this file.

File names are displayed as they are copied from the tape to the disk.

4. Restore files and /or directories:

   - From internal streaming tape by entering:

     dd if=/dev/rtp ibs=300k obs=5k | cpio ***-options pattern***

   - From SCSI tape by entering:

     dd if=/dev/rmt/c0d0h ibs=300k obs=63k | cpio ***-options pattern***

     where ***options*** equals **icvBdmu** for an unconditional restore, or **icvBdm** for a conditional restore, and ***pattern*** equals one of three values: the full pathname of a file for a file restore; the full pathname of a directory for a directory restore (with a suffix of /* - e.g., **/usr/acct/***); or the full pathname of files and/or directories for a multiple-file and/or directory restore.

     Note that directory pathnames must be suffixed with /* (e.g., **/usr/acct/***). The name-generating notation defined by **sh**(1) may be used.

Message of the Day

When a user logs into the system, part of the login procedure prints out a message of the day. This message can contain several lines of information useful to the user concerning scheduled down-time for hardware preventive maintenance (PM), clean-up messages for almost full file systems, or any other useful warnings to which users may need to be alerted. The trick to maintaining this file is to keep it short and to the point. A user does not want to wait ten minutes while eloquent and wordy dialogue is spewed from the terminal before he or she can begin working.

As with most of the procedures described in this guide, establishing the message of the day may be accomplished using the Menu System. For more information, see the *U 5000 and U 7000 Series Operating Systems Menu System Operating Guide*. To use the traditional procedure, however, follow the instructions presented in the following paragraphs.

The contents of the message of the day are stored in the file **/etc/motd**. You may change the contents of this file by using a 5000 system text editor. See ***ed*** or ***vi*** in the User Reference Manual. A sample of adding and deleting a line from this file with ***ed*** is shown in the following example:

```
# ed /etc/motd
26
p
9/23: Reboot at 5pm today.
d
a
```

```
9/24: Down for PM 1700-2100 on 9/30.
w
37
q
#
```

You can also remove the contents of the entire file (do not remove the file itself; it needs to exist so the login process can read it) by:

```
# cp /dev/null etc/motd
#
```

or by:

```
#> /etc/motd
#
```

System Shutdown

As with most other procedures described in this guide, **system shutdown** may be accomplished by means of the *U 5000 and U 7000 Series Operating Systems Menu Systems Operating Guide*. To use the traditional procedure, however, follow the instructions presented in the following paragraphs.

It is not necessary to bring the system completely down for certain maintenance operations. For example, preventive maintenance (such as filesaves) must be done while in single-user mode without halting the 5000 system. Repairing a hard fault would necessitate removing power completely. You should never remove power from a piece of equipment that is in service, and definitely do not power down the system until the operating system is halted.

Partial Shutdown

Whenever the system must be partially shut down, such as for a filesave, you should run the program **/etc/single**. This procedure is designed to gracefully turn off all processes and bring the system back to single-user state.

You must be in the root directory (/) to use this program.

> **NOTE:**
>
> The program **/etc/single** does not unmount any file systems. The program **single** may be modified by your administrator according to local procedures.

Complete Shutdown

Whenever the system must be completely shut down, such as for a reboot, you should run the program **/etc/shutdown**. This procedure is designed to gracefully turn off all processes and bring the system back to single-user state with all buffers flushed and the disk drives prepared for loss of power.

You must be in the **root** directory (/) to use the shutdown program. You may specify the amount of grace period between sending a warning message out and actually shutting down. This grace period is the number of seconds of delay. For example, specifying a grace period of 300 results in a 5-minute delay. You may also send

your own message. A default message is sent to all logged-in users if you don't type your own. The following script is an example of a typical shutdown sequence. Enter the following:

cd /
shutdown 300

Your shutdown procedure may vary slightly from the following, depending on how it is set up by your system administrator. The shutdown script may be modified by your administrator according to local procedures. A typical output is as follows:

do you want to shut down the system or go to single-user mode?

Enter 'y' to go single-user. Anything else shuts the system down: < **cr** >

SHUTDOWN PROGRAM

Thu Sep 1 18:51:58 EST 1987

Do you want to send your own message? (y or n): **y**
Enter your message. End with a < **Ctrl** > **d** in column 1 of the last line.

System coming down for filesaves!
Please log off.
< **Ctrl** > **d**

Broadcast Message from root (console)
Thu Sep 1 18:53:55 EST 1987...
System coming down for filesaves!
Please log off.

(*waits for 5 minutes*)

PREVENTING logins

Performing killall to terminate processes not associated with shutdown.

Shutdown complete. You may halt the system.

At the completion of this program you can halt the system (and reboot if necessary).

System Stop Analysis

An operating system is considered to have stopped when it halts itself without being asked. The reason for the halt is often unknown and can be hardware failure or software related. It is important, for obvious reasons, to determine the nature of the system stop so that it does not happen again. One way to do this is to take a dump of memory to streaming tape so that debugging programs can later decipher what processing was going on at the time the stop occurred.

To capture a system dump on streaming tape, follow the procedure explained in *crash* (8). Note that the dump must be taken before the system is rebooted.

Chapter 5. Diskette and Streaming Tape Operations

Introduction

Information in this chapter describes certain hardware operations on the 5000/20, 5000/30, 5000/35, 5000/40, 5000/50, or 5000/55 system processor. Specifically, this chapter tells you about operating and maintaining the internal diskette drive and the tape drive.

Diskette Drive

The 5.25-inch diskette drive reads and writes data from and to diskettes. When the power switch on the main unit is in the ON position, the diskette drive is ready for use. Power should never be applied to or removed from the unit when a diskette is installed. The red indicator on the diskette drive indicates that the unit is active.

Diskette

The diskette has a coat of magnetic material which is the recording surface. The diskette is inside a sealed jacket that is approximately 5.25 inches square. The drive accesses the recording surface of the diskette through the recording slot and the index hole in the jacket. Do not touch the magnetic material which is visible through these holes. Do not drop the diskette. If dirt is on the recording surface, the diskette should not be used.

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In addition to the jacket, a storage envelope is provided with each diskette to protect it from dirt. When the diskette is not installed in the drive, it must be in this envelope. When putting the diskette in its envelope, insert it so that the label is visible. This makes sure that the recording surface is protected from dirt.

Storing Diskettes

At all times, except when the diskette is installed in the drive, it must be in its envelope. Keep these envelopes in the diskette box. Do not put diskettes near any magnetic fields, such as those produced by motors, transformers, magnets, or magnetized tools. Also protect them from dirt and liquid. Diskettes must be permitted to reach the same temperature and humidity as that of the drive before they are used. This can be accomplished by storing the disks near the drive.

Labeling Diskettes

Each carton of diskettes typically includes 10 to 20 diskettes, a sheet of self-adhering diskette labels, and a sheet of self-adhering write-protect tabs.

When a diskette is used, a diskette label should be placed immediately to the right of the manufacturer's label. The label provides sufficient space for the date and the contents of the diskette. The contents should define the file system name or the names of the files on the diskette. Do not put more than two layers of labels on a diskette. A diskette with a number of labels on it may not fit properly into the drive.

Use a felt-tipped pen to write on diskette labels. Deposits from lead pencils, erasers, grease pencils, or ball-point pens can damage the recording surface. Write on the label before putting it on the diskette. Or, if the label is already on the diskette, write on the label only when the diskette is in the envelope.

Handling Diskettes

If the diskette is handled correctly, it can be used for a long time. Pay particular attention to the following points:

1. Do not put the diskette in direct sunlight.

2. Do not put a label on the seamed-side of the jacket.

3. Do not put paper clips or rubber bands on the jacket.

4. Do not touch the recording surface.

5. Do not, by any method, clean the diskette. The inner surface of the jacket cleans the diskette during processing.

To prevent inadvertent writing to any files on the diskette, a write-protect tab can be installed over the write-enabled slot. The tab should be installed on the diskette so that it adheres to both sides of the diskette while covering the write-enabled slot.

Installing Diskettes

The drive is less than two inches wide, and has a lever that makes a quarter turn to either block or unblock the drive unit slot.

Chapter 5

Use the following procedures to install a diskette in the drive:

1. Make sure the main unit is turned on. Do not install a diskette in the drive when the main unit is turned off.

2. Open the disk access door by turning the lever counterclockwise a quarter turn to unblock the drive unit slot.

3. Remove the diskette from its envelope; do not touch the recording surface.

4. With the label facing the right, and the write-enabled slot upward, carefully push the diskette into the drive until it is in position.

5. Turn the lever clockwise a quarter turn to block the drive access slot.

6. Protect the storage envelope from dirt, liquid, and magnetic material.

Removing Diskettes

Use the following procedures to remove a diskette from the drive:

1. Open the disk access door by turning the lever counterclockwise a quarter turn to unblock the drive unit slot. Do not attempt to open the drive when the red activity light is on.

2. Remove the diskette from the drive unit slot and place it in the envelope. Be sure to touch only the jacket and not the recording surface.

3. Put the diskette in the container box.

Streaming Tape Drive

The streaming tape drive reads and writes data to and from magnetic streaming tape cartridges. This chapter explains streaming tape drive operation and management.

The streaming tape cartridge is installed in, and accessed through a vertical opening in the main unit. When the main unit is turned on, the drive is ready for operation.

The drive read/write head must be clean to provide smooth operation. Clean it after every 40 hours of operation using the following procedure:

1. Be sure the power is turned off on the main unit.

2. Apply a freon-based solution to a clean cotton swab. Use the swab to clean the read/write head and the capstan.

3. Use a new swab to remove any remaining cleaning solution.

4. Remove any lint from the read/write head with a lint-free cloth.

Chapter 5

Cartridge Description

5000/20, 5000/30, 5000/40, and 5000/50 45-Megabyte Streaming Tape Drive

The magnetic data cartridge must have recording tape which is certified for 8000 bits per inch and 10,000 flux transitions per inch. The streaming tape cartridge contains a 9-track magnetic recording tape installed on two reels. The tracks recorded on the tape are serpentine in format. Each track is filled with data before the next track is started.

5000/35 and 5000/55 150-Megabyte Streaming Tape Drive

The magnetic data cartridge must have recording tape which is certified for 10,000 bits per inch and 12,500 flux transitions per inch. The streaming tape cartridge contains a 15 or 18-track magnetic recording tape installed on two reels. The tracks recorded on the tapes are serpentine in format. Each of the 18 tracks is 600 feet long and is filled with data before the next track is started.

The 150-megabyte tape drive and the 45-megabyte tape drive are not compatible with each other except to the extent that tapes recorded on a 45-megabyte tape drive can be read on a 150-megabyte drive. (A tape recorded on a 150-megabyte drive cannot be read on a 45-megabyte drive.)

The 5000/55 system can be expanded to include a 45-megabyte tape drive providing media transportability. The 5000/55 system will not accommodate the diskette drive when a second tape drive is installed.

The capacity of the tape drive actually depends on the type and length of tape that is used; the higher the recording density and the length of the tape, the more that may be written on the tape. Refer to Table 5-1 for summary information.

Table 5-1. Tape Drive Capacity Summary

Tape	45-Mb Drive Tracks	45-Mb Drive Capacity	150-Mb Drive Tracks	150-Mb Drive Capacity
450 foot 8,000 bpi/ 10,000 ftpi DC 300 XL	9	45-Mb	9	Read-only
600 foot 10,000 bpi/ 12,500 ftpi DC 600 A	9	60-Mb	15	125-Mb
600 foot 10,000 bpi/ 12,500 ftpi DC 600 XTD	N/A	N/A	18	150-Mb

NOTE:

A 150-megabyte drive will READ from a tape created on a 45-megabyte drive (9 tracks); but CANNOT write to the same type of tape.

A 45-megabyte drive CANNOT read or write to a tape created on a 150-megabyte drive (15 or 18 tracks).

Labeling Streaming Tapes

Each carton of streaming tapes includes self-adhering cartridge labels. One label should be put on the cartridge container, and one label should be put on the streaming tape cartridge. The labels should define the file system name or the file names of the files on the tape.

Use a felt-tipped pen to write on the streaming tape label. Deposits from lead pencils, erasers, grease pencils, or ball-point pens can damage the recording tape surface. Write on the label before putting it on the container or cartridge.

Storing Streaming Tapes

A streaming tape cartridge must be stored with the bottom (door) edge down. Storing the cartridge with the aluminum bottom in a horizontal position can cause the tape to become unevenly wound on the reels. Put the streaming

tape cartridge in its container so that when the bottom edge of the cartridge is down, the label on the container is visible. This makes it easy to select the correct cartridge.

At all times, except when installed in the drive, the streaming tape cartridge must be in its container and the container must be closed. When the cartridge is in the drive, the container must be closed to prevent contamination.

Streaming tape cartridges must be permitted to reach the same temperature and humidity as that of the drive before they are used. If cartridges are not kept in the same area as the drive, move them near the drive one hour before they are used.

Do not put streaming tape cartridges near any magnetic fields, such as those produced by motors, transformers, magnets, or magnetized tools.

Installing Streaming Tapes

When handling a streaming tape cartridge, do not touch the magnetic recording tape or drop the cartridge. Operation is smoother when the cartridge is clean.

When the cartridge locks in the drive, the tape is automatically positioned to the beginning of the first track. Do not remove the tape while the red activity light is on. The drive opens the cartridge read/write head access door while the cartridge is being inserted.

A data cartridge should not be in the drive unless it is being used by the program. If the cartridge is in the drive for a long period of time without the tape moving, heat

may cause the tape to lose its correct tension.
The tape drive is located near the top of the main unit. At the upper edge of the drive opening is located a sliding switch that moves up or down to unlock or lock the cartridge. Use the following procedure to install a streaming tape cartridge in the drive:

1. Move the sliding switch to the up position to unblock the drive unit slot.

2. Remove the streaming tape cartridge from its container and close the container.

3. Insert the streaming tape with the metal edge to the left and the capstan up. Slide the cartridge into the drive until it stops.

4. Move the slide switch down to lock the cartridge in position. Make sure that the slide switch clicks into position.

To remove the streaming tape cartridge, move the slide switch up. The drive will partially eject the cartridge. Pull the cartridge out and put it in the container.

Chapter 6. Expansion Cabinet Operations

Introduction

Three peripheral expansion cabinets are available for the 5000/20, 5000/30, 5000/35, 5000/40, 5000/50, and 5000/55 product line.

- A disk/tape expansion cabinet which includes a 1/2-inch tape and zero to two 340-megabyte disk drives.

- A disk expansion cabinet sized to match the 5000/35 system cabinet which includes one or two 337-megabyte disk drives.

- A disk expansion cabinet sized to match the 5000/55 system which includes one, two, or three 337-megabyte disk drives.

The 5000/35 and the 5000/55 systems support a Standalone 1/2-inch tape drive cabinet. For detailed information on the Standalone unit refer to the accompanying documentation.

The expansion cabinets are high performance storage devices. They use controllers that communicate with the host system through the Small Computer System Interface (SCSI) protocol.

The disk/tape expansion cabinet can be configured with a tape drive and up to two fixed disk drives. The 5000/35 expansion cabinet can be configured with up to two disk

drives. The 5000/55 expansion cabinet can be configured with up to three disk drives. The tape drive provides recording density of 41.2-megabytes (1600 bits per inch (bpi), 8-kilobytes records) or 74.6-megabytes (3200 bpi, 8-kilobytes records) of unformatted memory. Each fixed disk drive provides 340-megabytes of unformatted memory. In the 5000/35 and 5000/55 Expansion Cabinets each disk drive provides 337-megabytes of unformatted memory.

Power Switches

The main power switch for the disk/tape cabinet is on the lower back of the unit. There is also a separate power switch for the tape drive and a separate START and power switch for each fixed disk drive. On the back of the unit is a separate power switch for each hard disk. The main power switch for the 5000/35 and 5000/55 disk cabinet is on the front top-left corner. The 5000/55 MAIN POWER SWITCH turns on the first drive and turns on the power to the cabinet. A separate power switch is provided for each additional disk drive.

The following sections that refer to the disk drive and to the tape drive describe in detail the POWER and START switch plus the other front panel controls.

Fixed Disk Drive

This section describes the controls and indicators and the simple maintenance procedure for the fixed disk drive. Refer to Figure 6-1, 6-2, or 6-3 for the specific controls and indicators of your particular expansion cabinet.

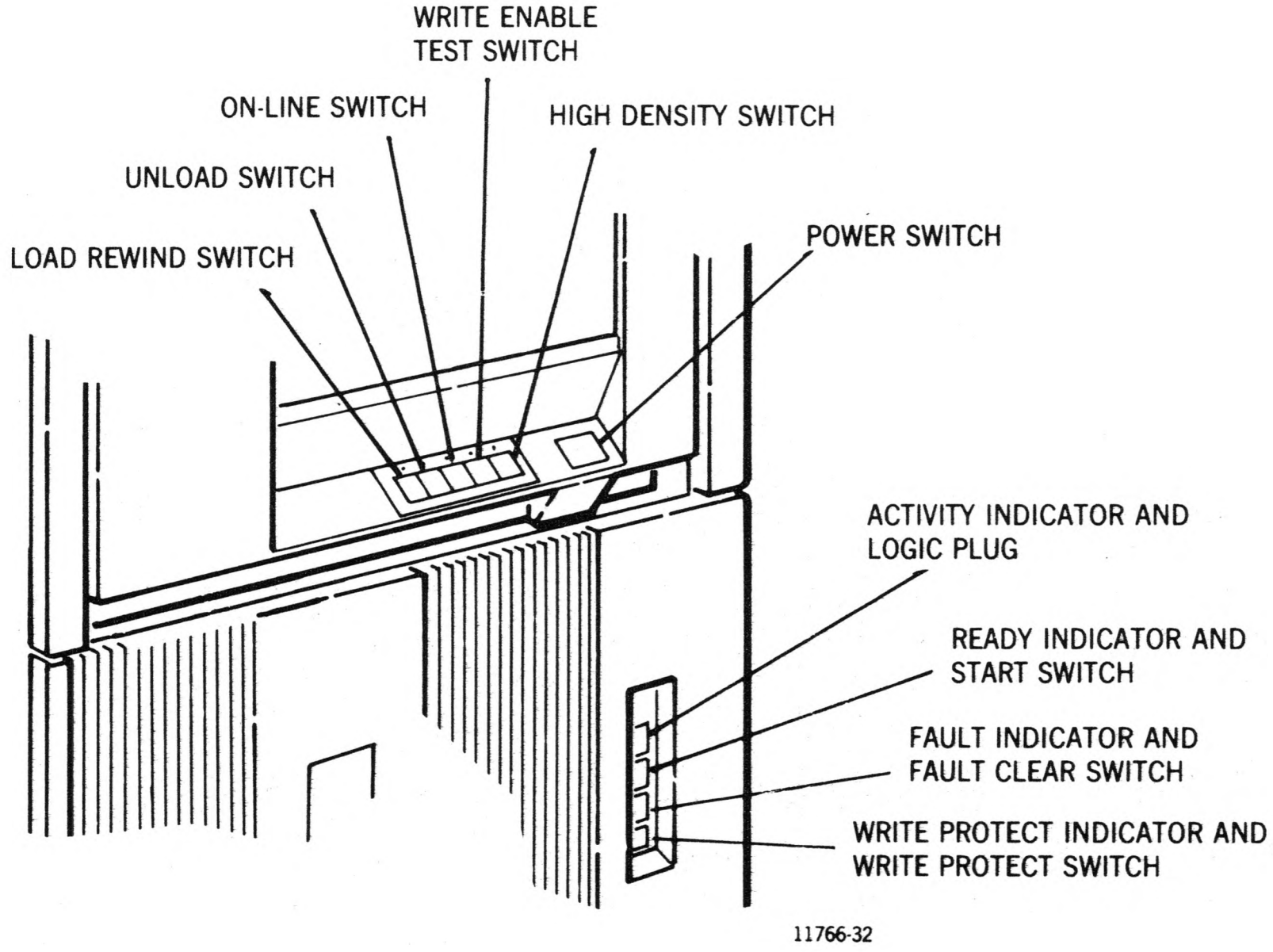

Figure 6-1. Front Panel Controls and Indicators on Disk/Tape Expansion Cabinet

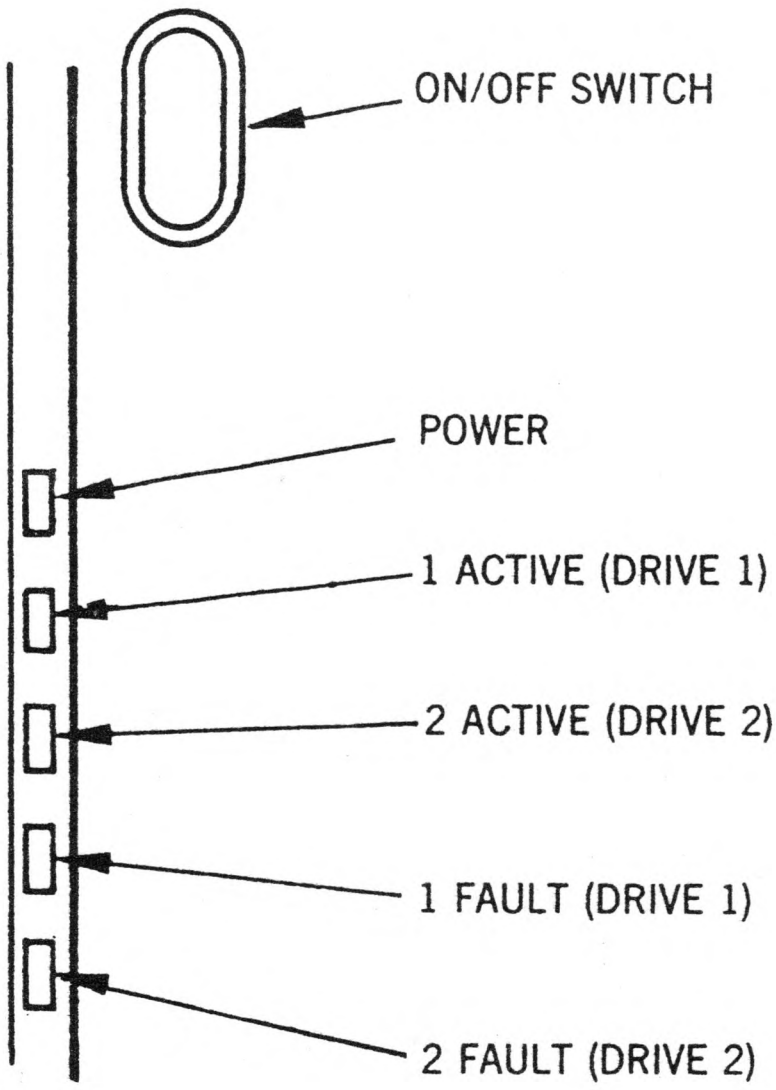

Figure 6-2. Front Panel Controls and Indicators on 5000/35 Disk Expansion Cabinet

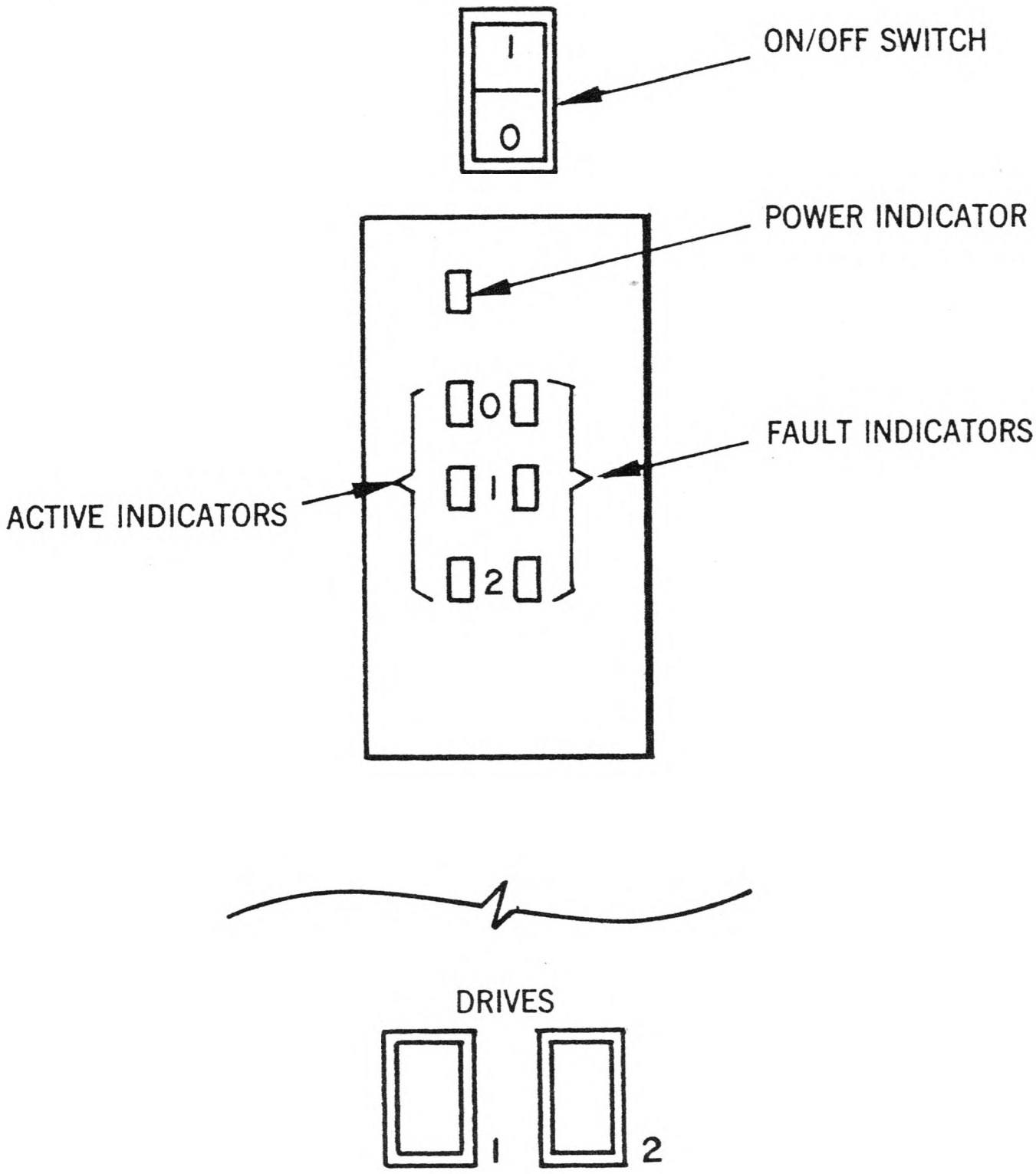

Figure 6-3. Front Panel Controls and Indicators on 5000/55 Disk Expansion Cabinet

Chapter 6

NOTE:

The following section only applies to the disk/tape expansion cabinet.

LOGIC Plug/ACTIVITY Indicator

The LOGIC plug establishes the logical address of the drive. The address, a number 0 or 1, is imprinted on it. The ACTIVITY indicator lights when the disk drive is selected and remains lit until the drive operation is completed.

CAUTION:

Do not pull the LOGIC plug out when the drive is in use. Taking the plug out cuts off the power and may damage the disk drive.

START Button/READY Indicator

The START button turns on the power to start the disk rotation. When you press the START button the READY indicator flashes until:

- the disks are up to speed,
- the heads are loaded, and
- there are no fault conditions.

The READY indicator stays lit when the power-up sequence is complete. To stop the disk rotation, press the START button again so that the button is in the out position. The READY indicator flashes until the disk rotation stops.

FAULT CLEAR Button/FAULT Indicator

The FAULT indicator lights if a fault exists within the drive. The indicator turns off when the error condition no longer exists and you do one of the following:

- press the FAULT CLEAR button,
- send a fault clear command from the controller, or
- turn drive power off, and then on again.

WRITE PROTECT Button/Indicator

Pressing the WRT PRT (write protect) button puts the drive in the write-protected mode and lights the indicator which denotes the status of the drive. You can also put the drive in write-protected mode by placing the NORM/W PROT jumper on the disk drive controller board in the W PROT position.

Chapter 6

Maintaining the Disk Drives

NOTE:

There is no operator maintenance required for the 5000/35 or the 5000/55 expansion cabinets.

The only operator maintenance required on the disk drive is cleaning or replacing the air filters located on the front door of the disk drive on the disk/tape cabinet only. Inspect the air filter periodically and replace or clean it when it is dirty. Cleaning the filter is recommended only if replacement filters are not available. In computer room conditions, a six-month interval is recommended between filter maintenance. In other conditions, how often you clean the filter depends on the operating environment.

To clean or change the air filters perform the following steps:

1. Remove the disk drive door by pushing the slide clips on the bottom of the cabinet toward the center while pulling the bottom of the door away from the unit.

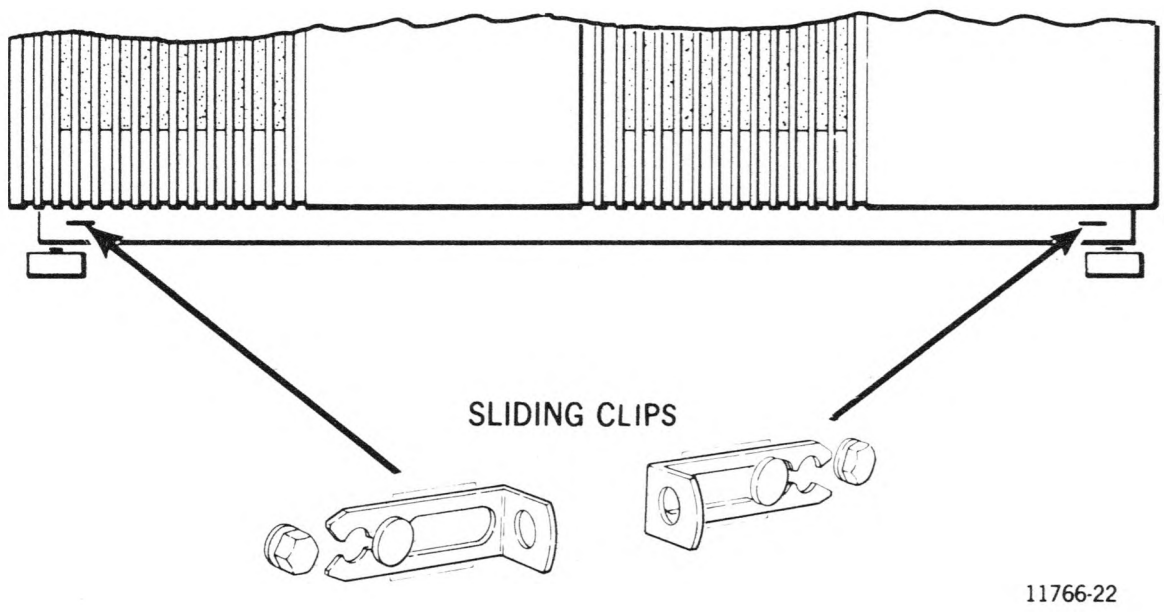

Figure 6-4. Removing the Disk Drive Door Clips

2. Remove the filter retainers on the back of the door by removing the screws that hold the filter retainer in place.

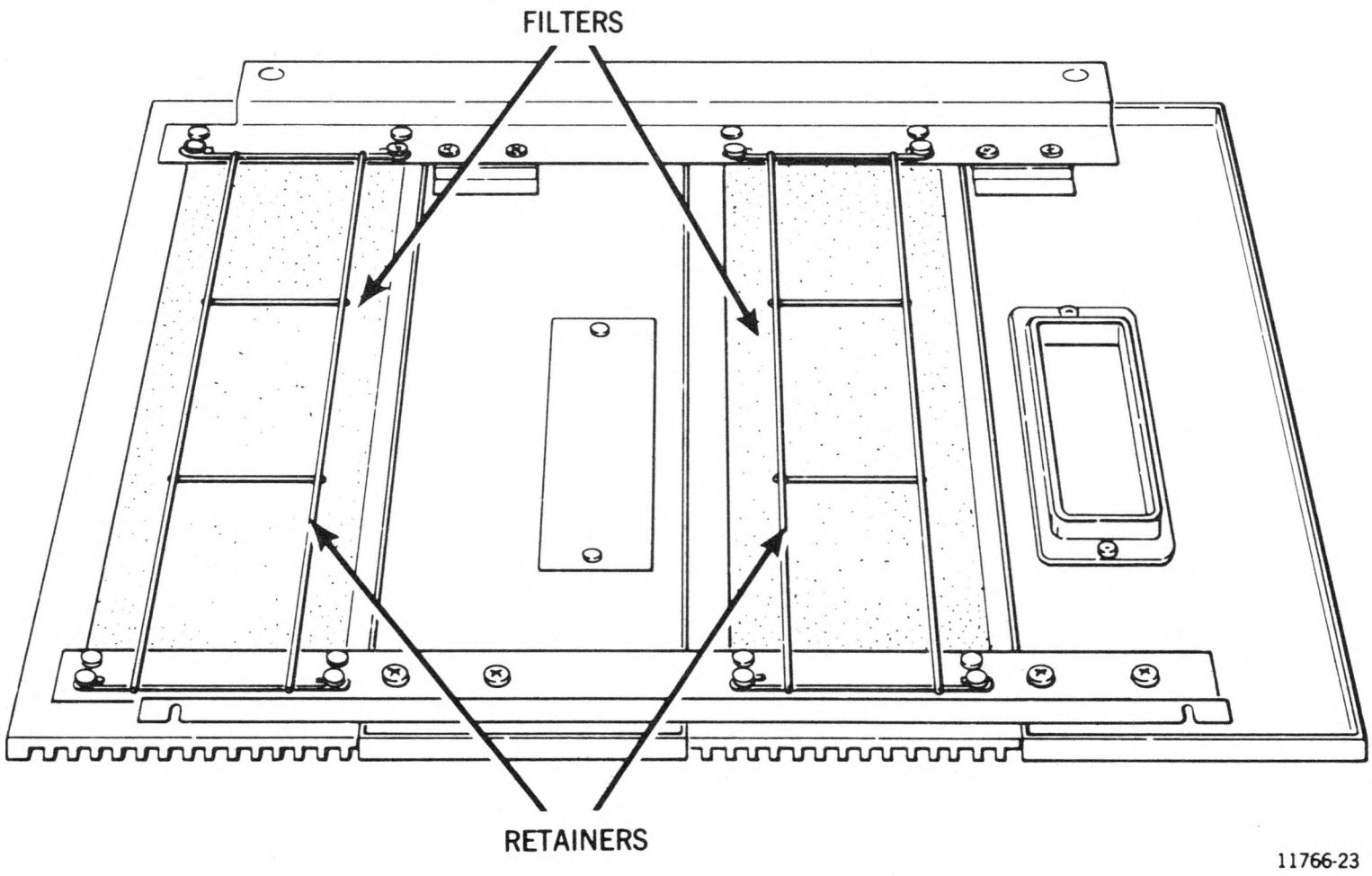

Figure 6-5. Removing Filter Retainers

3. Gently remove the air filter from the disk drive. Make sure you do not damage the filter.

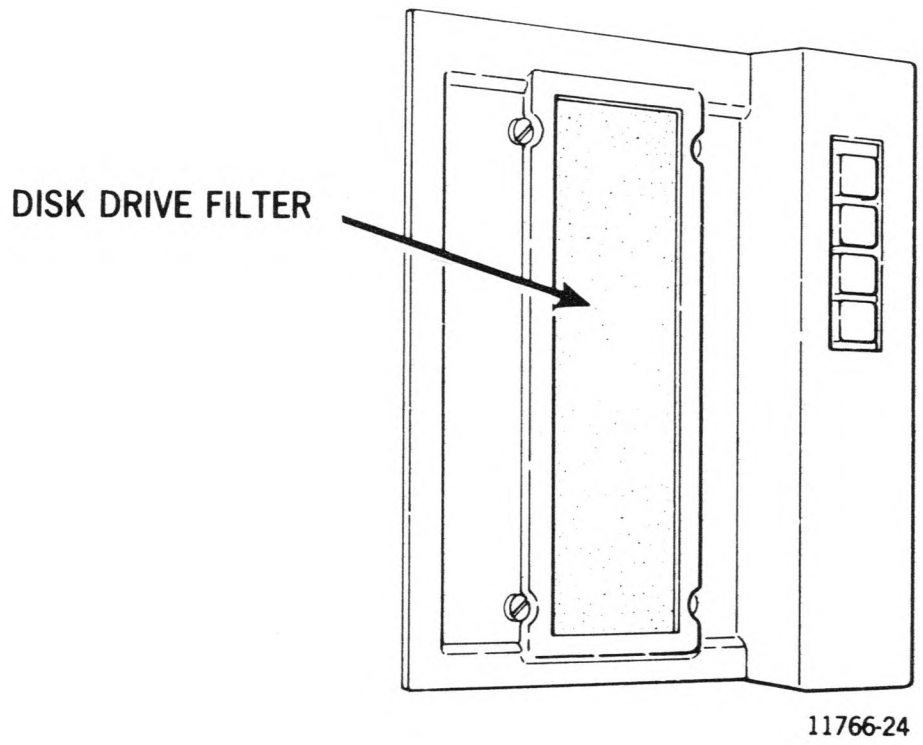

Figure 6-6. Removing the Air Filter

4. Inspect the air filters for excessive dirt or damage such as torn areas.

5. Discard the filters if they are dirty or damaged and replace them with new ones. If replacement filters are not available, clean the filters by agitating them in a solution of warm water and soap. Rinse the filter thoroughly with clean water and allow it to dry before installing it. (If the filter is not completely dry before you install it, the moisture could damage the system.)

6. Reinstall the new or cleaned filter.

Tape Drive

This section describes the front panel controls, tape loading and unloading procedures, the simple maintenance procedures, and the error codes.

Front Panel Controls and Indicators

All the tape drive switches are tactile (press-sensitive) switches with associated indicators.

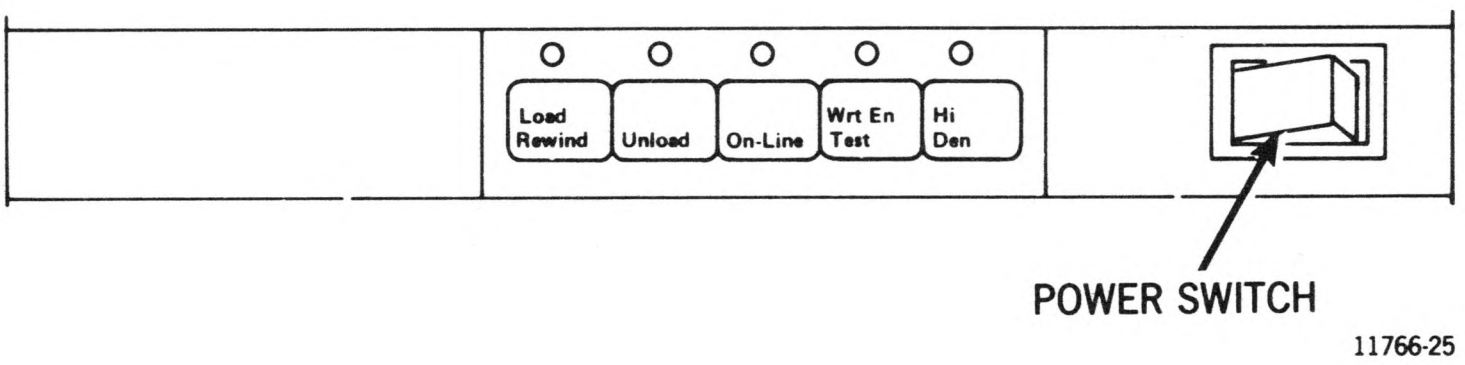

Figure 6-7. Tape Drive Switches

POWER Switch/Indicator

The POWER switch turns on the power to the tape drive and initiates the power-up diagnostics. The indicator lights when the power is on.

Pressing the LOAD/REWIND switch automatically locks the tape access door and loads and advances a tape to the beginning of the tape (BOT). (The unload indicator should be lit while you insert the tape into the drive and before you press the LOAD/REWIND switch.)

The LOAD/REWIND indicator flashes during tape motion. It stops flashing and remains lit when the tape reaches the BOT. If you press this switch when a tape on the take-up hub is past the BOT marker and the unit is off-line, the tape rewinds to the BOT. Like the first loading sequence, the indicator flashes during tape motion and remains illuminated when the BOT is reached.

NOTE:

If you want to bypass auto load, you must hold down the HI DEN switch while pressing the LOAD/REWIND switch. This should be done after the tape is manually threaded through the tape path and wound around the takeup hub more than once. The section in this chapter called "Loading the Tape Manually" explains the tape loading procedure.

UNLOAD Switch/Indicator

Pressing the UNLOAD switch unloads the tape from any position provided the tape drive is offline. The indicator flashes during tape motion. It stops and remains lit when the unload sequence is completed. The panel door unlocks to allow access to the tape.

ON-LINE Switch/Indicator

Pressing the ON-LINE switch during or after the load sequence puts the tape drive on online when the BOT is

sensed. The ON-LINE indicator lights when the drive is online and ready to accept external commands. The indicator turns off when you press the ON-LINE switch a second time to put the drive on local control. When the tape is online, all other operator switches are deactivated.

WRITE ENABLE/TEST (WRT EN) Switch/Indicator

Pressing the WRT EN TEST switch with the tape drive offline selects a diagnostics mode for the front panel switches. For further information on the diagnostics mode, refer to the Diagnostics Reference Manual. The HI DEN indicator flashes to indicate that the diagnostic mode must be initiated within three seconds. If the diagnostic mode is not initiated within three seconds, the drive remains offline. Pressing the switch a second time returns the panel switches to their normal mode of operation. During normal operation the illuminated WRT EN TEST indicator means that the write enable ring is present on the supply reel, enabling write commands.

HIGH DENSITY (HI DEN) Switch/Indicator

To put the drive in high density (3200 bpi) mode, press the HI DEN switch after:

- the tape drive is at the BOT,
- the load sequence completes, and
- you've taken the drive offline after the initial load sequence is completed.

The HI DEN indicator is then illuminated when it is in high density mode.

Pressing the switch a second time selects a low density (1600 bpi) mode. The drive remains in the low density mode during any subsequent unloading operations.

You can specify density only when the drive is at the BOT.

Loading the Tape

This section explains how to load a reel of tape on to the tape drive.

> **NOTE:**
>
> Errors may occur when loading a tape. If an indicator light is flashing when it shouldn't, there is an error. Refer to the section in this chapter called "Error Codes".

1. Turn on the power and make sure the UNLOAD indicator is lit. (Allow for a normal two-second delay).

2. Make sure the tape is wound completely onto the reel.

3. Open the tape access door by gently pressing down on the center of the door.

4. Place a write-enable ring in the slot on the back of the reel if you plan to enter data on the tape. To prevent changes from being made to the tape, remove the write-enable ring if one is attached.

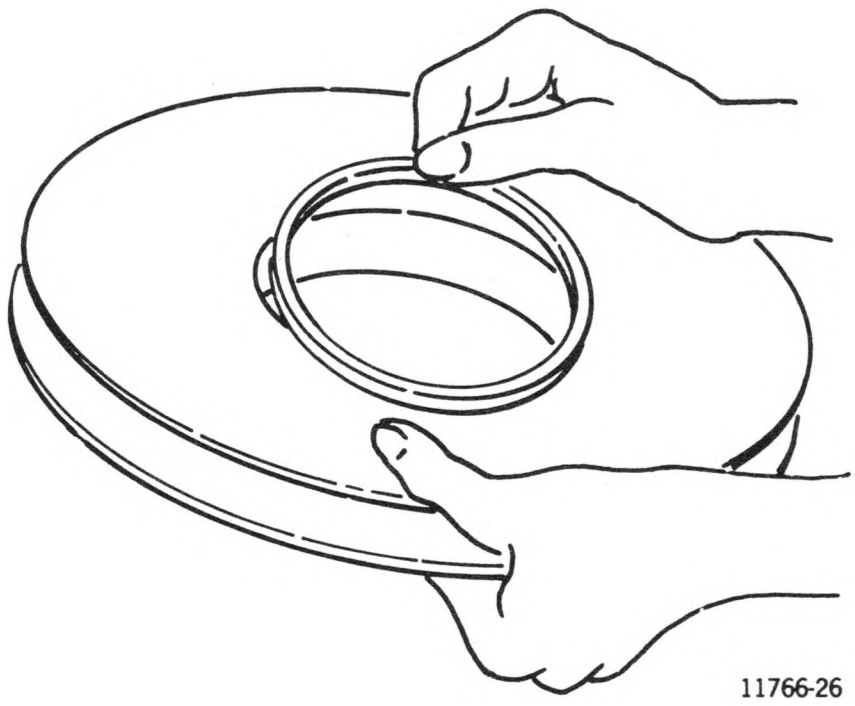

Figure 6-8. Write-enable Ring

5. Insert the reel into the front of the tape drive with the write-enable ring (or opaque side) facing down. The reel should lie evenly on the hub.

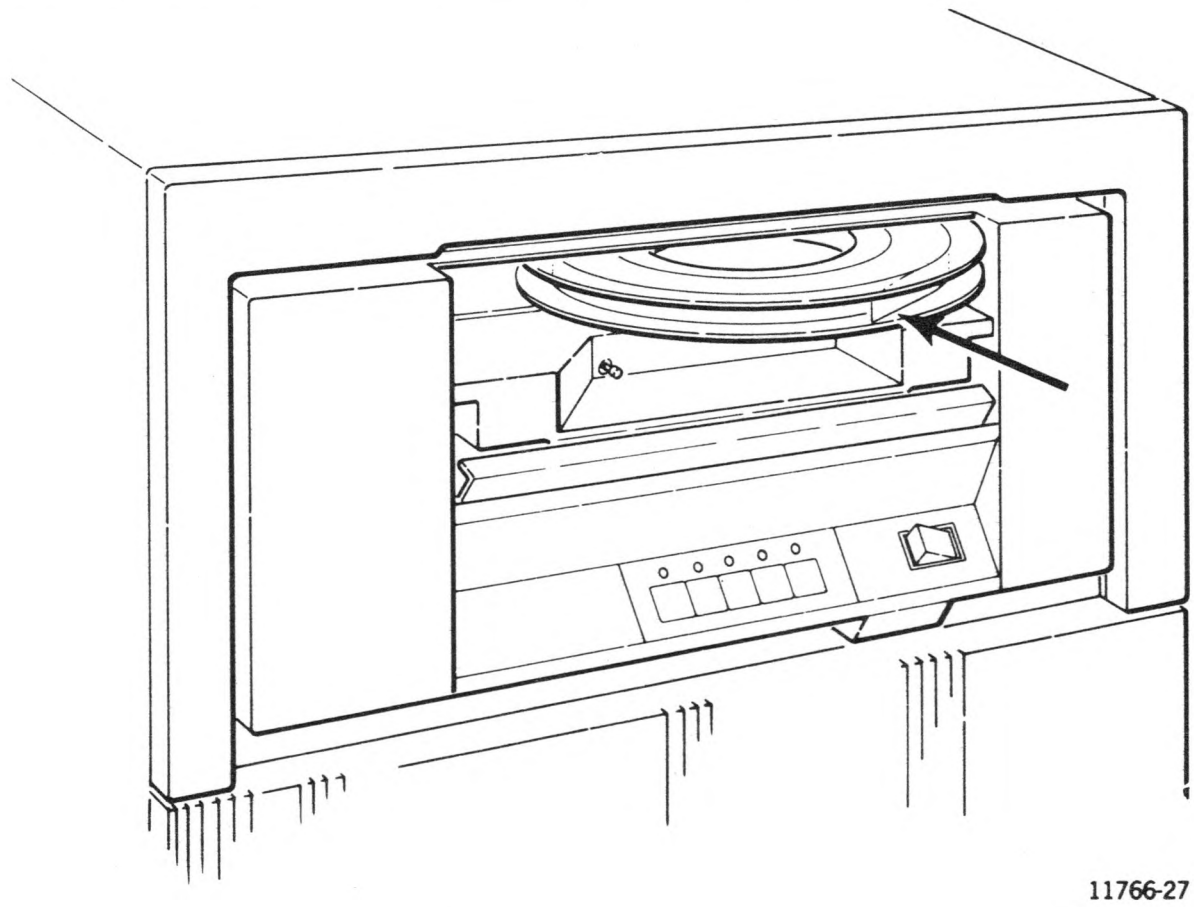

Figure 6-9. Inserting the Reel

6. Close the front panel door.

7. Press the LOAD switch. The access doors are now locked. The LOAD indicator flashes while the tape loads and stays lit when loading is complete.

Unloading the Tape

To unload a tape from the tape drive perform the following steps:

1. Take the drive offline by pressing the ON-LINE switch. The ON-LINE indicator should be off when the drive is in offline mode.

2. Press the UNLOAD switch which causes the indicator to flash.

3. Open the front panel door when the UNLOAD indicator stops flashing and stays lit.

4. Carefully remove the tape reel and close the door.

Loading the Tape Manually

If the tape fails to load automatically, try loading it manually.

1. Carefully lift up the top access door on the expansion cabinet until the spring-loaded latch (located on the inside bottom right-hand corner of the door) locks into place.

2. Lift up the left side of the tape drive cover. While holding up the top cover, place the plastic safety support post in the hole on the left edge of the tape drive.

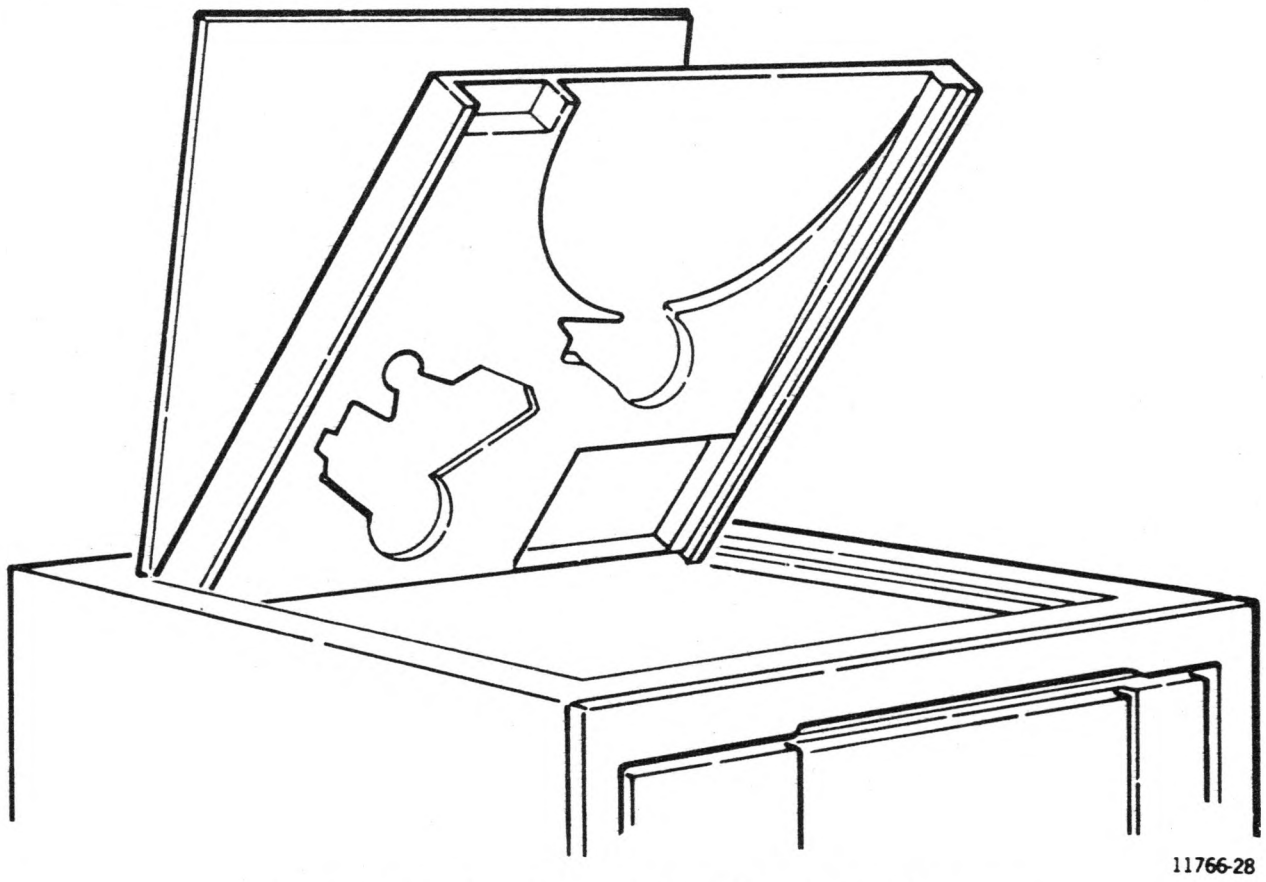

Figure 6-10. Tape Drive Cover

3. Place the reel on the supply hub. Make sure the reel is evenly seated on the hub.

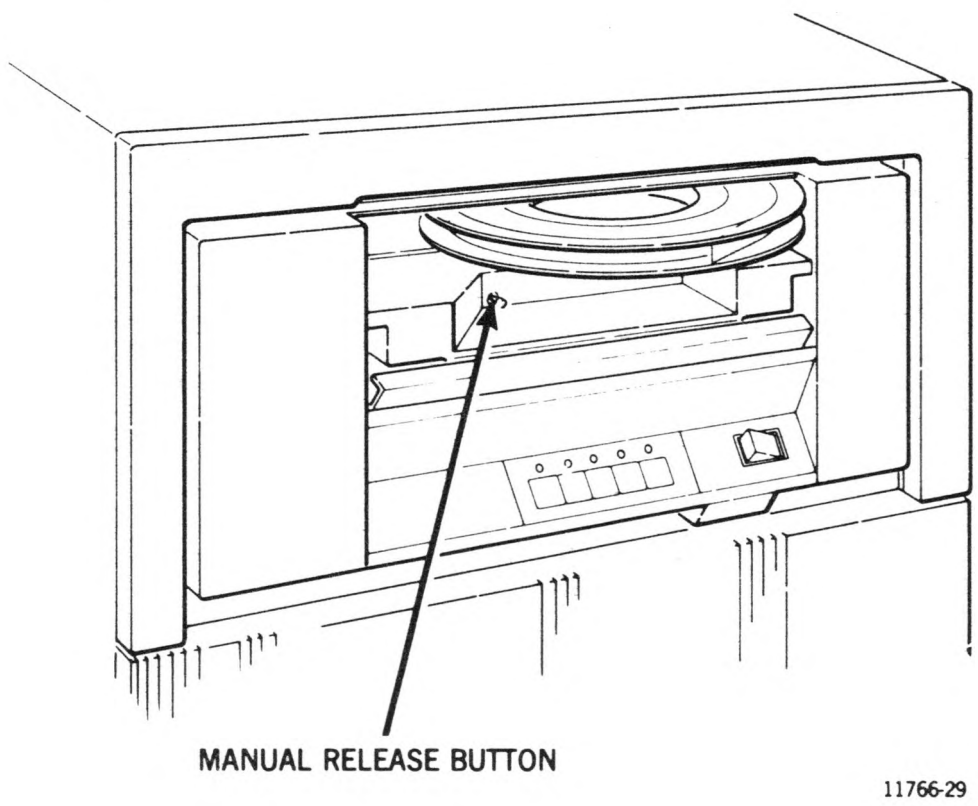

Figure 6-11. Placing the Reel on the Supply Hub

4. Find the manual UNLOCK button behind the front panel door on the bottom left of the tape reel opening. Press this button down and hold it while rotating the tape reel clockwise until the reel is locked into place.

5. Thread the tape, beginning at the supply hub, along the path shown in this figure.

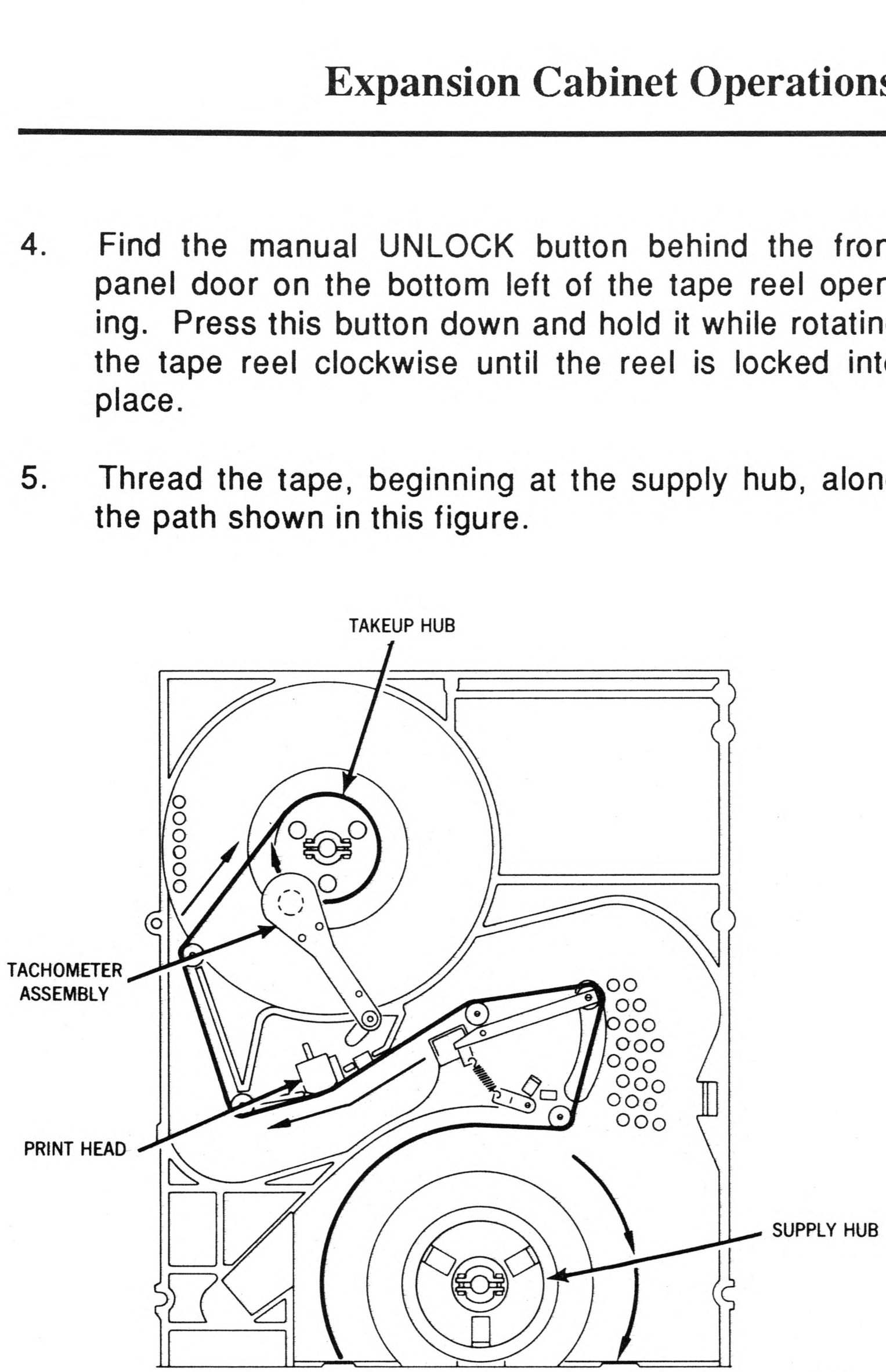

Figure 6-12. Manually Threading the Tape

6. Carefully move the tachometer assembly away from the take-up hub.

7. Wrap the tape clockwise around the take-up hub and then gently move the tachometer assembly back into position. Make sure the tape is seated correctly on the guides and threaded properly over the head assembly.

8. Lift up the top cover of the tape drive and move the plastic safety support post to the back of the cover and then close the door.

9. Use your left hand to slightly lift up the top access door and then use your right hand to guide the spring-loaded latch forward along the groove until the latch unlocks. Carefully close the door.

10. Hold down the HI DEN switch and press the LOAD/ REWIND switch, and then release both. The LOAD indicator lights when the tape drive is ready for use.

Unloading the Tape Manually

If the tape drive does not unload the tape automatically, try unloading it manually.

1. Carefully lift up the top access door on the expansion cabinet until the spring-loaded latch (located on the inside, bottom, right-hand corner of the door) locks into place.

2. Lift up the left side of the cover of the tape drive. While holding up the top cover, place the plastic safety support post in the hole on the left edge of the tape drive.

3. Rotate the supply reel in a counterclockwise direction to rewind the tape onto the supply reel.

4. Find the manual UNLOCK button behind the front panel door on the bottom left of the tape reel opening. Press this button down and hold it while rotating the tape reel counterclockwise until it rotates freely and can be removed from the tape drive.

5. Lift up the top cover of the tape drive and move the plastic safety support post to the back of the cover and then close the door.

6. Use your left hand to slightly lift up the top access door and then use your right hand to guide the spring-loaded latch forward along the groove until the latch unlocks. Carefully close the door.

Maintaining the Tape Drive

The only operator maintenance required is routine cleaning of various components of the tape path in the tape drive. The recording head requires cleaning every 4.2 hours of tape movement or daily (not to exceed once daily). The other components should be cleaned weekly.

Cleaning the Tape Path Components

To clean the components, use the Unisys tape drive cleaning kit available from your Unisys representative. Never apply the cleaner directly to the surface of the parts to be cleaned. Always apply the cleaner to a swab or to a clean, dry lint-free cloth, carefully removing any excess cleaner. The tachometer roller and roller guides contain precision bearings. Solvents allowed to run into the bearings break down the lubricant.

This diagram shows the components to be cleaned.

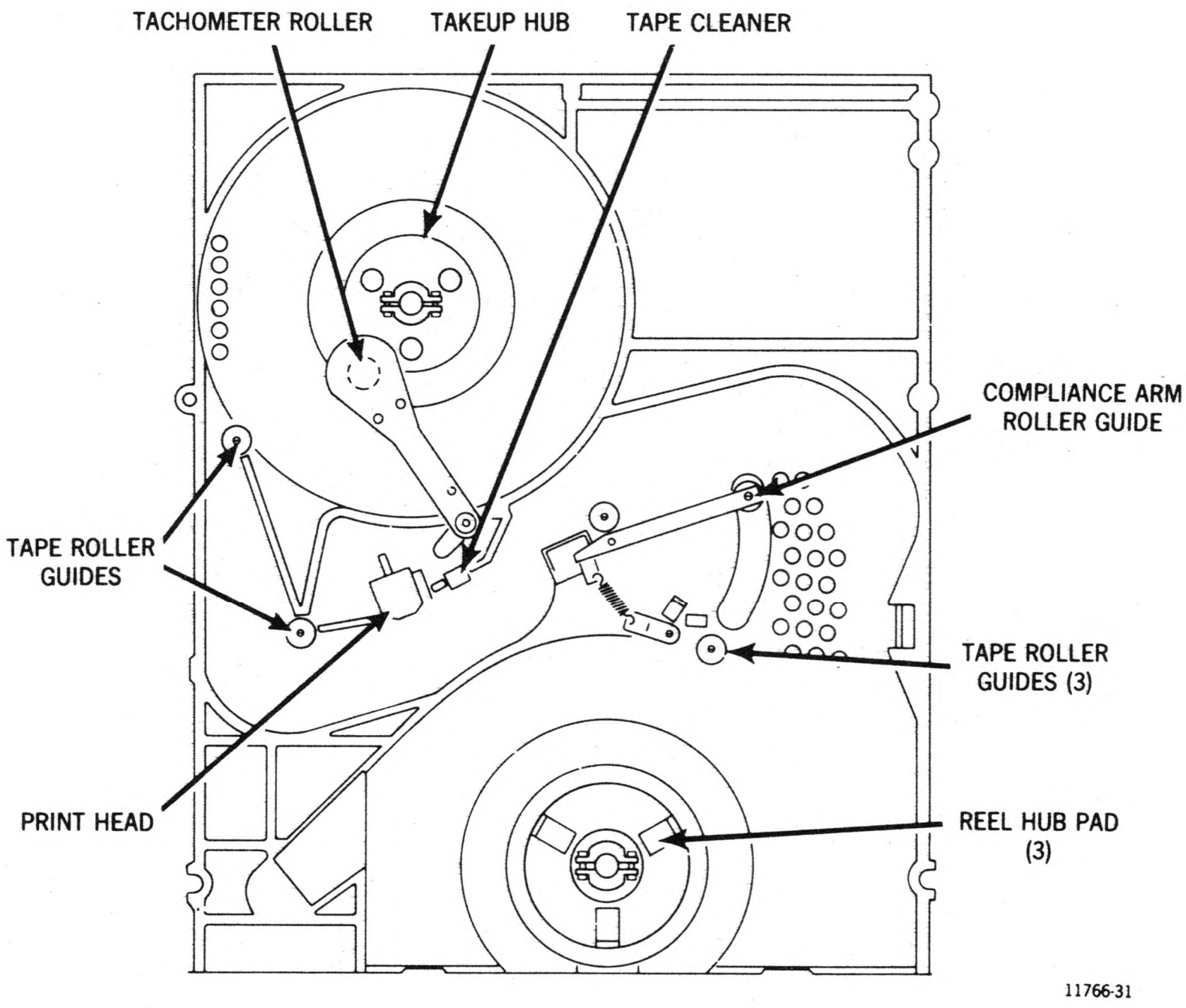

Figure 6-13. Tape Drive Cleaning Areas

Observe the following procedures for cleaning the components:

Tachometer Roller — can be rotated by slowly turning the take-up hub. Gently wipe the entire roller surface with a swab moistened with the tape drive cleaner.

Take-Up Hub — is cleaned by rotating the hub manually while gently wiping the tape wrapping surface with a swab or cloth moistened with tape drive cleaner.

Roller Guides — are cleaned by rotating each roller and gently wiping the tape contact surface, flanges, and washer with a swab moistened with tape drive cleaner.

Reel Hub Pads — are cleaned by wiping the contact surface of each pad with a swab or cloth moistened with tape drive cleaner and removing any debris around the pad.

Head — is cleaned by wiping the entire face of the head and attached erase bar with a swab or cloth moistened with tape drive cleaner. Pay close attention to the recessed areas while cleaning.

CAUTION:

Make sure you do not use materials that are rough or abrasive to clean the head. Rough or abrasive materials can scratch sensitive surfaces of the head and cause permanent damage. Also, other cleaners such as alcohol-based cleaners can cause read/write errors.

Tape Cleaner — should have each blade carefully wiped along its length with a swab moistened with tape drive cleaner. Remove the accumulated oxides from the recessed area between the blades.

Cleaning the Air Filter

To clean the tape drive air filter perform the following steps:

1. Remove the filter from inside the air duct opening at the lower left side of the tape drive front panel.

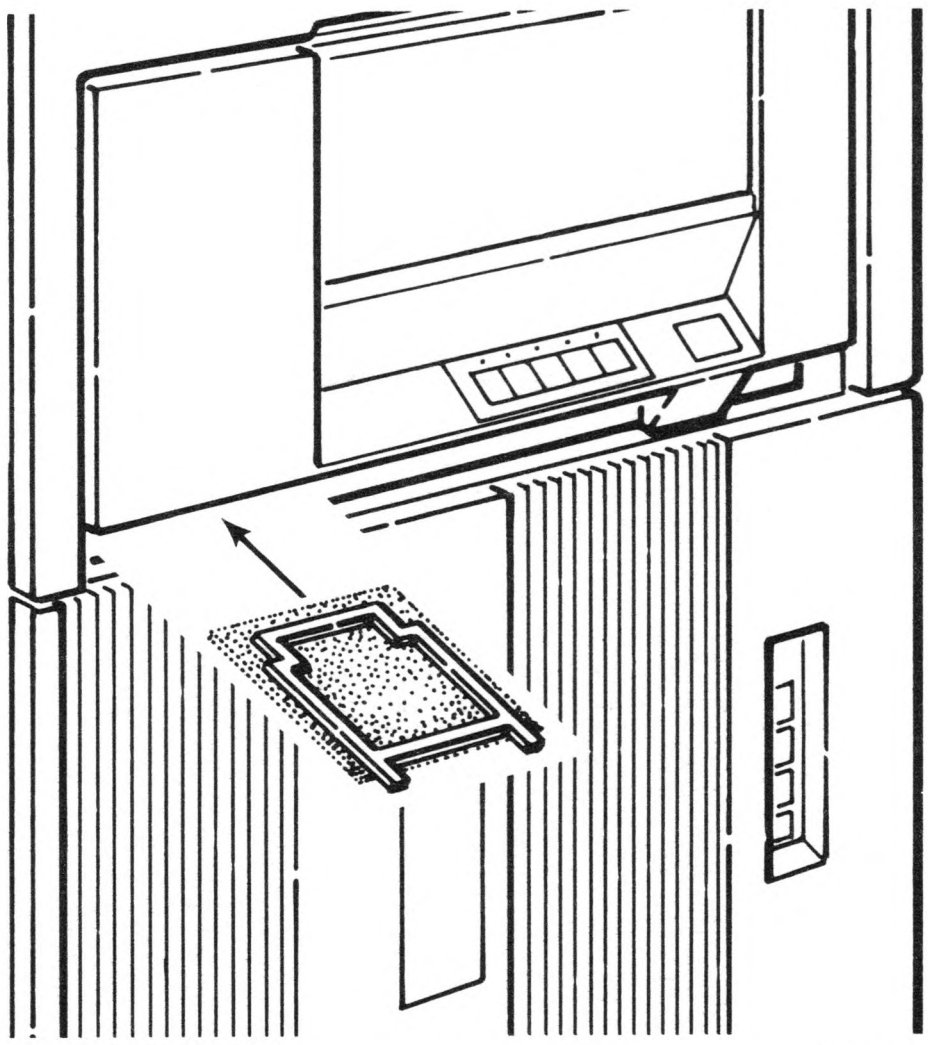

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Figure 6-14. Removing the Filter

2. Shake the filter clean or use a vacuum to remove the dust.

3. Replace the air filter.

Error Codes

Certain errors can occur during normal tape loading operations. If there is a tape drive error, some combination of the indicator lights flash, alerting the operator to an error. This table defines the error codes.

Indications	Conditions
All indicators flashing	After four attempts, the tape drive did not successfully complete the load sequence. The tape leader should be checked for damage. If a second attempt at automatic loading fails, refer to the section in this chapter on loading the tape manually.
All indicators except LOAD flashing	The BOT marker was not detected within the first 35 feet of tape. The leader must be a minimum of 6 feet in length.
All indicators except UNLOAD flashing	The supply reel is inserted upside down. The flashing bottom of the supply reel is indicated by the presence of an insertable write-enable ring near the inside mounting radius.
All indicators except ON-LINE flashing	A load or unload operation was attempted with front panel door or the top access door open.
All indicators except WRT EN TEST flashing	A load operation was attempted without inserting a supply reel into the tape drive.